



Robert Moser, MD, Secretary

Department of Health & Environment

Sam Brownback, Governor

MEMORANDUM

DATE: February 29, 2012

TO: El Dorado 2.1 File
2010 Funding EPA CWSRF
KWPCRF Project No.: C20 1827 01

FROM: Rod Geisler, PE, Chief Municipal Programs Section *Rod G.*

SUBJECT: El Dorado, Kansas
Project to Construct On-site Wind Powered Generator
EPA Green Project Reserve

Similar to the ARRA funding effort, the Federal Clean Water SRF funding provided in FFY 2010 requires a 20% "Green Project Reserve" (GPR) for use of the Federal funds. EPA wrote new guidance to define qualifying uses for the Green Project Reserve requirements for the FFY 2010 funding, dated April 21, 2010 (copy attached). As stated on page 1, paragraph "II. GPR Goals." The "intent" is "to guide funding toward projects that...adopt practices that reduce the environmental footprint of...wastewater treatment...help utilities adapt to climate change, enhance water and energy conservation...". The project at El Dorado, Kansas, achieves this goal by providing a method to generate electricity using the renewable resources of wind power.

The project being funded will provide the installation of a one megawatt wind turbine generator at the City of El Dorado, Kansas wastewater treatment facility. In addition to the wind turbine generator, the project includes installation of all other necessary appurtenant facilities and electrical interconnection equipment and controls to the local electrical utility to allow net metering and the sale of excess electricity generated to the local utility. A review of the FFY 2010 GPR guidance as presented below indicates this project meets the requirements to qualify as a Green Project Reserve project in accordance with these Federal guidelines.

0.1 All GPR projects must otherwise be eligible for CWSRF funding.

- The project at El Dorado is eligible.

0.2 All Section 212 projects must be consistent with the definition of "treatment works" as set forth in Section 212 of the Clean Water Act (CWA).

- The project at El Dorado is a "Section 212" project, the wastewater treatment plant is publicly owned, and the project will have an indirect water quality benefit by improving the efficiency and reliability of the electrical power supply, utilizing a renewable source of energy, and reducing the amount of power purchased from off-site.

0.3 Eligible non-point source projects...

- NA. This is not a non-point source project.

0.4 Eligible projects under Section 320...

- NA. This is not a Section 320 project.

0.5 GPR projects must meet the definition of one of the four GPR categories.

- See below

0.6 GPR projects must further the goals of the Clean Water Act.

CWSRF Technical Guidance

1.0 Green Infrastructure

- NA

2.0 Water Efficiency

- NA

3.0 Energy Efficiency

3.1 Definition: Energy efficiency is the use of improved technologies and practices to reduce the energy consumption of water quality projects, use energy in a more efficient way, and/or produce/utilize renewable energy.

- The project at El Dorado achieves this goal by producing and utilizing renewable energy for use in the wastewater treatment process.

3.2 Categorical Projects

3.2.1 Renewable energy projects such as wind, solar, geothermal, micro-hydroelectric, and biogas combined heat and power systems (CHP) that provide power to a POTW. (<http://www.epa.gov/cleanenergy>). Micro-hydroelectric projects involve capturing the energy from pipe flow.

- This is a renewable energy project utilizing wind to provide power to a POTW.

3.2-1a POTW owned renewable energy projects can be located on-site or off-site.

- The wind generator is located on-site.

3.2-1b Includes the portion of a publically owned renewable energy project that serves POTWs energy needs.

- NA, the entire electrical output of the windmill generator is used by the WWTP or the benefits of excess electricity produced go to the WWTP budget.

3.2-1c Must feed into the grid that the utility draws from and/or there is a direct connection.

- At El Dorado there is a direct connection of the windmill generator to the WWTP and a Purchase Power Agreement (copy attached) to allow feed of electricity into the grid.

3.2.2 Projects that achieve a 20% reduction in energy consumption are categorically eligible for GPR⁴. Retrofit projects should compare energy used by the existing system or unit process⁵ to the proposed project. The energy used by the existing system should be based on name plate data when the system was first installed, recognizing that the old system is currently operating at a lower overall efficiency than at the time of installation. New POTW projects or capacity expansion projects should be designed to maximize energy efficiency and should select high efficiency premium motors and equipment where cost effective. Estimation of the energy efficiency is necessary for the project to be counted toward GPR. If a project achieves less than a 20% reduction in energy efficiency, then it may be justified using a business case.

⁴The 20% threshold for categorically eligible CWSRF energy efficiency projects was derived from a 2002 Department of Energy study entitled *United States Industrial Electric Motor Systems Market Opportunities Assessment, December 2002* and adopted by the Consortium for Energy Efficiency. Further field studies conducted by Wisconsin Focus on Energy and other States programs support the threshold.

⁵A unit process is a portion of the wastewater system such as the collection system, pumping stations, aeration system, or solids handling, etc.

- NA

3.2-3 Collection system Infiltration/Inflow (I/I) detection equipment

- NA

3.2-4 POTW energy management planning...

- NA

3.3 Projects that do not meet the definition of Energy Efficiency.

- NA

3.4 Decision Criteria for Business Cases

- NA

3.5 Examples of Projects Requiring a Business Case

- NA

4.0 Environmentally Innovative

- NA

Therefore, the project at El Dorado meets the EPA definition of being "categorically" green as defined in the EPA Green Project Reserve guidance. The loan agreement is funded by the FFY 2010 Cap Grant and so will provide 15% principal forgiveness for all engineering and construction costs, and will also provide an additional 25% principal forgiveness for the cost of construction of the qualifying "green design components" based on the approved bid form and a proportionate amount of the engineering costs. Based on information presently available, the entire project is expected to qualify as "green design components".

The estimated total cost of the project is \$2,356,252. The loan amount will be \$2,106,252, as the project has received a \$250,000 grant from the Federal Dept. of Energy. The entire loan cost is considered eligible for 40% principal forgiveness, subject to final review of design plans and specifications and all project costs.

Attached

Enclosures

- FFY 2010 EPA GPR Guidance (14 pp)
- Payback Analysis e-mail (2pp)
- Wind Savings Calculator (19pp)
- Plan of Operation (2pp)
- Interconnection Application (5pp)
- Renewal Energy Purchase Agreement dated Dec. 28, 2011 (35pp)
- Aerial Photo
- Data Sheet
- Wind Turbine Feasibility Study (46pp)
- 2/28/12 Payment vs Saving Spreadsheet, Updated to Reflect Actual Project Costs (1pp)

Pc: Rance Walker (Memo Only)
Rod Geisler (Memo Only)

ATTACHMENT 2

2010 Clean Water and Drinking Water State Revolving Fund 20% Green Project Reserve: Guidance for Determining Project Eligibility

April 21, 2010

I. Introduction: The Fiscal Year (FY) 2010 Appropriation Law (P.L. 111-88) included additional requirements affecting both the Clean Water and the Drinking Water State Revolving Fund (SRF) programs. This attachment is included in the *Procedures for Implementing Certain Provisions of EPA's Fiscal Year 2010 Appropriation Affecting the Clean Water and Drinking Water State Revolving Fund Programs* dated April 21, 2010. Because of differences in project eligibility for each program, the Clean and Drinking Water SRFs have separate guidance documents that identify specific goals and eligibilities for green infrastructure, water and energy efficient improvements, and environmentally innovative activities. Part A includes the details for the Clean Water SRF program, and Part B the Drinking Water SRF program.

Public Law 111-88 included the language “Provided, that for fiscal year 2010, to the extent there are sufficient eligible project applications, not less than 20 percent of the funds made available under this title to each State for Clean Water State Revolving Fund capitalization grants and not less than 20 percent of the funds made available under this title to each State for Drinking Water State Revolving Fund capitalization grants shall be used by the State for projects to address green infrastructure, water or energy efficiency improvements, or other environmentally innovative activities.” These four categories of projects are the components of the Green Project Reserve (GPR).

II. GPR Goals: Congress’ intent in enacting the GPR is to direct State investment practices in the water sector to guide funding toward projects that utilize green or soft-path practices to complement and augment hard or gray infrastructure, adopt practices that reduce the environmental footprint of water and wastewater treatment, collection, and distribution, help utilities adapt to climate change, enhance water and energy conservation, adopt more sustainable solutions to wet weather flows, and promote innovative approaches to water management problems. Over time, GPR projects could enable utilities to take savings derived from reducing water losses and energy consumption, and use them for public health and environmental enhancement projects. Additionally, EPA expects that green projects will help the water sector improve the quality of water services without putting additional strain on the energy grid, and by reducing the volume of water lost every year.

III. Background: EPA used an inclusive approach to determine what is and is not a ‘green’ water project. Wherever possible, this guidance references existing consensus-based industry practices to provide assistance in developing green projects. Input was solicited from State-EPA and EPA-Regional workgroups and the water sector. EPA staff also reviewed approaches promoted by green practice advocacy groups and water associations, and green infrastructure implemented by engineers and managers in the water sector. EPA also assessed existing ‘green’ policies within

EPA and received input from staff in those programs to determine how EPA funds could be used to achieve shared goals.

The 2010 SRF GPR Guidance provides States with information needed to determine which projects count toward the GPR requirement. The intent of the GPR Guidance is to describe projects and activities that fit within the four specific categories listed in the 2010 Appropriations Act. This guidance defines each category of GPR projects and lists projects that are clearly eligible for GPR, heretofore known as categorically eligible projects. For projects that do not appear on the list of categorically projects, they may be evaluated for their eligibility within one of the four targeted types of GPR eligible projects based upon a business case that provides clear documentation (see the *Business Case Development* sections in Parts A & B below).

GPR may be used for planning, design, and/or building activities. Entire projects, or the appropriate discrete components of projects, may be eligible for GPR. Projects do not have to be part of a larger capital project to be eligible. All projects or project components counted toward the GPR requirement must clearly advance one or more of the objectives articulated in the four categories of GPR discussed below.

The Green Project Reserve sets a new precedent for the SRFs by targeting funding towards projects that States' may not have funded in prior years. Water quality benefits from GPR projects rely on proper operation and maintenance to achieve the intended benefits of the projects and to achieve optimal performance of the project. EPA encourages states and funding recipients to thoroughly plan for proper operation and maintenance of the projects funded by the SRFs, including training in proper operation of the project. It is noted, however, that the SRFs cannot provide funding for operation and maintenance costs, including training, in the SRF assistance agreements. Some of these costs may, however, be funded through appropriate DWSRF set-asides under limited conditions.

PART A – CWSRF GPR SPECIFIC GUIDANCE

CWSRF Eligibility Principles

State SRF programs are responsible for identifying projects that count toward GPR. The following overarching principles, or decision criteria, apply to all projects that count toward GPR and will help states identify projects.

- 0.1 All GPR projects must otherwise be eligible for CWSRF funding. The GPR requirement does not create new funding authority beyond that described in Title VI of the CWA. Consequently, a subset of 212, 319 and 320 projects will count towards the GPR. The principles guiding CWSRF funding eligibility include:
 - 0.2 All Sec 212 projects must be consistent with the definition of “treatment works” as set forth in section 212 of the Clean Water Act (CWA).
 - 0.2-1 All section 212 projects must be publicly owned, as required by CWA section 603(c)(1).
 - 0.2-2 All section 212 projects must serve a public purpose.
 - 0.2-3 POTWs as a whole are utilized to protect or restore water quality. Not all portions of the POTW have a direct water quality impact in and of themselves (i.e. security fencing). Consequently, POTW projects are not required to have a direct water quality benefit, though most of them will.
 - 0.3 Eligible nonpoint source projects implement a nonpoint source management program under an approved section 319 plan or the nine element watershed plans required by the 319 program.
 - 0.3-1 Projects prevent or remediate nonpoint source pollution.
 - 0.3-2 Projects can be either publicly or privately owned and can serve either public or private purposes. For instance, it is acceptable to fund land conservation activities that preserve the water quality of a drinking water source, which represents a public purpose project. It is also acceptable to fund agricultural BMPs that reduce nonpoint source pollution, but also improve the profitability of the agricultural operation. Profitability is an example of a private purpose.
 - 0.3-3 Eligible costs are limited to planning, design and building of capital water quality projects. The CWSRF considers planting trees and shrubs, purchasing equipment, environmental cleanups and the development and initial delivery of education programs as capital water quality projects. Daily maintenance and operations, such as expenses and salaries are not considered capital costs.
 - 0.3-4 Projects must have a direct water quality benefit. Implementation of a water quality project should, in itself, protect or improve water quality. States should be able to estimate the quantitative and/or qualitative water quality benefit of a nonpoint source project.
 - 0.3-5 Only the portions of a project that remediate, mitigate the impacts of, or prevent water pollution or aquatic or riparian habitat degradation should be funded. Where water quantity projects improve water quality (e.g. reduction of flows from impervious surfaces that adversely affect stream health, or the modification of irrigation systems to reduce runoff and leachate from irrigated lands), they would be

considered to have a water quality benefit. In many cases, water quality protection is combined with other elements of an overall project. For instance, brownfield revitalization projects include not only water quality assessment and cleanup elements, but often a redevelopment element as well. Where the water quality portion of a project is clearly distinct from other portions of the project, only the water quality portion can be funded by the CWSRF.

0.3-6 Point source solutions to nonpoint source problems are eligible as CWSRF nonpoint source projects. Section 319 Nonpoint Source Management Plans identify sources of nonpoint source pollution. In some cases, the most environmentally and financially desirable solution has point source characteristics and requires an NPDES discharge permit. For instance, a septage treatment facility may be crucial to the proper maintenance and subsequent functioning of decentralized wastewater systems. Without the septage treatment facility, decentralized systems are less likely to be pumped, resulting in malfunctioning septic tanks.

0.4 Eligible projects under section 320 implement an approved section 320 Comprehensive Conservation Management Plan (CCMP).

0.4-1 Section 320 projects can be either publicly or privately owned.

0.4-2 Eligible costs are limited to capital costs.

0.4-3 Projects must have a direct benefit to the water quality of an estuary. This includes protection of public water supplies and the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife, and allows recreational activities, in and on water, and requires the control of point and nonpoint sources of pollution to supplement existing controls of pollution.

0.4-4 Only the portions of a project that remediate, mitigate the impacts of, or prevent water pollution in the estuary watershed should be funded.

0.5 GPR projects must meet the definition of one of the four GPR categories. The Individual GPR categories do not create new eligibility for the CWSRF. The projects that count toward GPR must otherwise be eligible for CWSRF funding.¹

0.6 GPR projects must further the goals of the Clean Water Act.

¹ Drinking Water Utilities can apply for CWSRF funding

CWSRF Technical Guidance

The following sections outline the technical aspects for the CWSRF Green Project Reserve. It is organized by the four categories of green projects: green infrastructure, water efficiency, energy efficiency, and environmentally innovative activities. Categorically green projects are listed, as well as projects that are ineligible. Design criteria for business cases and example projects that would require a business case are also provided.

1.0 GREEN INFRASTRUCTURE

1.1 Definition: Green stormwater infrastructure includes a wide array of practices at multiple scales that manage wet weather and that maintain and restore natural hydrology by infiltrating, evapotranspiring and harvesting and using stormwater. On a regional scale, green infrastructure is the preservation and restoration of natural landscape features, such as forests, floodplains and wetlands, coupled with policies such as infill and redevelopment that reduce overall imperviousness in a watershed. On the local scale green infrastructure consists of site- and neighborhood-specific practices, such as bioretention, trees, green roofs, permeable pavements and cisterns.

1.2 Categorical Projects

- 1.2-1 Implementation of green streets (combinations of green infrastructure practices in transportation rights-of-ways), for either new development, redevelopment or retrofits including: permeable pavement², bioretention, trees, green roofs, and other practices such as constructed wetlands that can be designed to mimic natural hydrology and reduce effective imperviousness at one or more scales. Vector trucks and other capital equipment necessary to maintain green infrastructure projects.
- 1.2-2 Wet weather management systems for parking areas including: permeable pavement², bioretention, trees, green roofs, and other practices such as constructed wetlands that can be designed to mimic natural hydrology and reduce effective imperviousness at one or more scales. Vector trucks and other capital equipment necessary to maintain green infrastructure projects.
- 1.2-3 Implementation of comprehensive street tree or urban forestry programs, including expansion of tree boxes to manage additional stormwater and enhance tree health.
- 1.2-4 Stormwater harvesting and reuse projects, such as cisterns and the systems that allow for utilization of harvested stormwater, including pipes to distribute stormwater for reuse.
- 1.2-5 Downspout disconnection to remove stormwater from sanitary, combined sewers and separate storm sewers and manage runoff onsite.
- 1.2-6 Comprehensive retrofit programs designed to keep wet weather discharges out of all types of sewer systems using green infrastructure technologies and approaches such as green roofs, green walls, trees and urban reforestation, permeable pavements and bioretention cells, and turf removal and replacement with native vegetation or trees that improve permeability.
- 1.2-7 Establishment or restoration of permanent riparian buffers, floodplains, wetlands and other natural features, including vegetated buffers or soft bioengineered stream banks.

² The total capital cost of permeable pavement is eligible, not just the incremental additional cost when compared to impervious pavement.

This includes stream day lighting that removes natural streams from artificial pipes and restores a natural stream morphology that is capable of accommodating a range of hydrologic conditions while also providing biological integrity. In highly urbanized watersheds this may not be the original hydrology.

- 1.2-8 Projects that involve the management of wetlands to improve water quality and/or support green infrastructure efforts (e.g., flood attenuation).³

- 1.2-8a Includes constructed wetlands.

- 1.2-8b May include natural or restored wetlands if the wetland and its multiple functions are not degraded and all permit requirements are met.

- 1.2-9 The water quality portion of projects that employ development and redevelopment practices that preserve or restore site hydrologic processes through sustainable landscaping and site design.

- 1.2-10 Fee simple purchase of land or easements on land that has a direct benefit to water quality, such as riparian and wetland protection or restoration.

1.3 Projects That Do Not Meet the Definition of Green Infrastructure

- 1.3-1 Stormwater controls that have impervious or semi-impervious liners and provide no compensatory evapotranspirative or harvesting function for stormwater retention.

- 1.3-2 Stormwater ponds that serve an extended detention function and/or extended filtration. This includes dirt lined detention basins.

- 1.3-3 In-line and end-of-pipe treatment systems that only filter or detain stormwater.

- 1.3-4 Underground stormwater control and treatment devices such as swirl concentrators, hydrodynamic separators, baffle systems for grit, trash removal/floatables, oil and grease, inflatable booms and dams for in-line underground storage and diversion of flows.

- 1.3-5 Stormwater conveyance systems that are not soil/vegetation based (swales) such as pipes and concrete channels. Green infrastructure projects that include pipes to collect stormwater may be justified as innovative environmental projects pursuant to Section 4.4 of this guidance.

- 1.3-6 Hardening, channelizing or straightening streams and/or stream banks.

- 1.3-7 Street sweepers, sewer cleaners, and vacuum trucks unless they support green infrastructure projects.

1.4 Decision Criteria for Business Cases

- 1.4-1 Green infrastructure projects are designed to mimic the natural hydrologic conditions of the site or watershed.

- 1.4-2 Projects that capture, treat, infiltrate, or evapotranspire water on the parcels where it falls and does not result in interbasin transfers of water.

- 1.4-3 GPR project is in lieu of or to supplement municipal hard/gray infrastructure.

- 1.4-4 Projects considering both landscape and site scale will be most successful at protecting water quality.

³ Wetlands are those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, vernal pools, and similar areas.

1.4-5 Design criteria are available at:

<http://cfpub.epa.gov/npdes/greeninfrastructure/munichandbook.cfm> and

<http://cfpub.epa.gov/npdes/greeninfrastructure/technology.cfm> and

1.5 Examples of Projects Requiring A Business Case

1.5-1 Fencing to keep livestock out of streams and stream buffers. Fencing must allow buffer vegetation to grow undisturbed and be placed a sufficient distance from the riparian edge for the buffer to function as a filter for sediment, nutrients and other pollutants.

2.0 WATER EFFICIENCY

2.1 Definition: EPA's WaterSense program defines water efficiency as the use of improved technologies and practices to deliver equal or better services with less water. Water efficiency encompasses conservation and reuse efforts, as well as water loss reduction and prevention, to protect water resources for the future.

2.2 Categorical Projects

2.2-1 Installing or retrofitting water efficient devices, such as plumbing fixtures and appliances

2.2-1a For example -- shower heads, toilets, urinals and other plumbing devices

2.2-1b Where specifications exist, WaterSense labeled products should be the preferred choice (<http://www.epa.gov/watersense/index.html>).

2.2-1c Implementation of incentive programs to conserve water such as rebates.

2.2-2 Installing any type of water meter in previously unmetered areas

2.2-2a If rate structures are based on metered use

2.2-2b Can include backflow prevention devices if installed in conjunction with water meter

2.2-3 Replacing existing broken/malfunctioning water meters, or upgrading existing meters, with:

2.2-3a Automatic meter reading systems (AMR), for example:

2.2-3a(i) Advanced metering infrastructure (AMI)

2.2-3a(ii) Smart meters

2.2-3b Meters with built in leak detection

2.2-3c Can include backflow prevention devices if installed in conjunction with water meter replacement

2.2-4 Retrofitting/adding AMR capabilities or leak detection equipment to existing meters (not replacing the meter itself).

2.2-5 Water audit and water conservation plans, which are reasonably expected to result in a capital project.

2.2-6 Recycling and water reuse projects that replace potable sources with non-potable sources,

2.2-6a Gray water, condensate and wastewater effluent reuse systems (where local codes allow the practice)

2.2-6b Extra treatment costs and distribution pipes associated with water reuse.

2.2-7 Retrofit or replacement of existing landscape irrigation systems to more efficient landscape irrigation systems, including moisture and rain sensing controllers.

2.2-8 Retrofit or replacement of existing agricultural irrigation systems to more efficient agricultural irrigation systems.

2.3 Projects That Do Not Meet the Definition of Water Efficiency

2.3-1 Agricultural flood irrigation.

2.3-2 Lining of canals to reduce water loss.

2.3-3 Replacing drinking water distribution lines. This activity extends beyond CWSRF eligibility and is more appropriately funded by the DWSRF.

2.3-4 Leak detection equipment for drinking water distribution systems, unless used for reuse distribution pipes.

2.4 Decision Criteria for Business Cases

2.4-1 Water efficiency can be accomplished through water saving elements or reducing water consumption. This will reduce the amount of water taken out of rivers, lakes, streams, groundwater, or from other sources.

2.4-2 Water efficiency projects should deliver equal or better services with less net water use as compared to traditional or standard technologies and practices

2.4-3 Efficient water use often has the added benefit of reducing the amount of energy required by a POTW, since less water would need to be collected and treated; therefore, there are also energy and financial savings.

2.5 Examples of Projects Requiring a Business Case.

2.5-1 Water meter replacement with traditional water meters (see AWWA M6 *Water Meters – Selection Installation, Testing, and Maintenance*).

2.5-2 Projects that result from a water audit or water conservation plan

2.5-3 Storage tank replacement/rehabilitation to reduce loss of reclaimed water.

2.5-4 New water efficient landscape irrigation system.

2.5-5 New water efficient agricultural irrigation system.

3.0 ENERGY EFFICIENCY

3.1 Definition: Energy efficiency is the use of improved technologies and practices to reduce the energy consumption of water quality projects, use energy in a more efficient way, and/or produce/utilize renewable energy.

3.2 Categorical Projects

3.2-1 Renewable energy projects such as wind, solar, geothermal, micro-hydroelectric, and biogas combined heat and power systems (CHP) that provide power to a POTW. (<http://www.epa.gov/cleanenergy>). Micro-hydroelectric projects involve capturing the energy from pipe flow.

3.2-1a POTW owned renewable energy projects can be located onsite or offsite.

3.2-1b Includes the portion of a publicly owned renewable energy project that serves POTW's energy needs.

3.2-1c Must feed into the grid that the utility draws from and/or there is a direct connection.

3.2-2 Projects that achieve a 20% reduction in energy consumption are categorically eligible for GPR⁴. Retrofit projects should compare energy used by the existing system or unit process⁵ to the proposed project. The energy used by the existing system should be based on name plate data when the system was first installed, recognizing that the old system is currently operating at a lower overall efficiency than at the time of installation. New POTW projects or capacity expansion projects should be designed to maximize energy efficiency and should select high efficiency premium motors and equipment where cost effective. Estimation of the energy efficiency is necessary for the project to be counted toward GPR. If a project achieves less than a 20% reduction in energy efficiency, then it may be justified using a business case.

3.2-3 Collection system Infiltration/Inflow (I/I) detection equipment

3.2-4 POTW energy management planning, including energy assessments, energy audits, optimization studies, and sub-metering of individual processes to determine high energy use areas, which are reasonably expected to result in a capital project are eligible. Guidance to help POTWs develop energy management programs, including assessments and audits is available at http://www.epa.gov/waterinfrastructure/pdfs/guidebook_si_energymanagement.pdf.

3.3 Projects That Do Not Meet the Definition of Energy Efficiency

3.3-1 Renewable energy generation that is *privately* owned or the portion of a publicly owned renewable energy facility that does not provide power to a POTW, either through a connection to the grid that the utility draws from and/or a direct connection to the POTW.

3.3-2 Simply replacing a pump, or other piece of equipment, because it is at the end of its useful life, with something of average efficiency.

3.3-3 Facultative lagoons, even if integral to an innovative treatment process.

3.3-4 Hydroelectric facilities, except micro-hydroelectric projects. Micro-hydroelectric projects involve capturing the energy from pipe flow.

3.4 Decision Criteria for Business Cases

3.4-1 Project must be cost effective. An evaluation must identify energy savings and payback on capital and operation and maintenance costs that does not exceed the useful life of the asset.

http://www.epa.gov/waterinfrastructure/pdfs/guidebook_si_energymanagement.pdf

3.4-2 The business case must describe how the project maximizes energy saving opportunities for the POTW or unit process.

3.4-3 Using existing tools such as Energy Star's Portfolio Manager

(http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomana)

⁴ The 20% threshold for categorically eligible CWSRF energy efficiency projects was derived from a 2002 Department of Energy study entitled *United States Industrial Electric Motor Systems Market Opportunities Assessment, December 2002* and adopted by the Consortium for Energy Efficiency. Further field studies conducted by Wisconsin Focus on Energy and other States programs support the threshold.

⁵ A unit process is a portion of the wastewater system such as the collection system, pumping stations, aeration system, or solids handling, etc.

ger) or Check Up Program for Small Systems (CUPSS) (<http://www.epa/cupss>) to document current energy usage and track anticipated savings.

3.5 Examples of Projects Requiring a Business Case

- 3.5-1 POTW projects or unit process projects that achieve less than a 20% energy efficiency improvement.
- 3.5-2 Projects implementing recommendations from an energy audit that are not otherwise designated as categorical.
- 3.5-3 Projects that cost effectively eliminate pumps or pumping stations.
- 3.5-4 Infiltration/Inflow (I/I) correction projects that save energy from pumping and reduced treatment costs and are cost effective.
 - 3.5-4a Projects that count toward GPR cannot build new structural capacity. These projects may, however, recover existing capacity by reducing flow from I/I.
- 3.5-5 I/I correction projects where excessive groundwater infiltration is contaminating the influent requiring otherwise unnecessary treatment processes (i.e. arsenic laden groundwater) and I/I correction is cost effective.
- 3.5-6 Replacing pre-Energy Policy Act of 1992 motors with National Electric Manufacturers Association (NEMA) premium energy efficiency motors.
 - 3.5-8a NEMA is a standards setting association for the electrical manufacturing industry (<http://www.nema.org/gov/energy/efficiency/premium/>).
- 3.5-7 Upgrade of POTW lighting to energy efficient sources such as metal halide pulse start technologies, compact fluorescent, light emitting diode (LED).
- 3.5-8 SCADA systems can be justified based upon substantial energy savings.
- 3.5-9 Variable Frequency Drive can be justified based upon substantial energy savings.

4.0 ENVIRONMENTALLY INNOVATIVE

4.1 Definition: Environmentally innovative projects include those that demonstrate new and/or innovative approaches to delivering services or managing water resources in a more sustainable way.

4.2 Categorical Projects

- 4.2-1 Total/integrated water resources management planning likely to result in a capital project.
- 4.2-2 Utility Sustainability Plan consistent with EPA's SRF sustainability policy.
- 4.2-3 Greenhouse gas (GHG) inventory or mitigation plan and submission of a GHG inventory to a registry (such as Climate Leaders or Climate Registry)
 - 4.3-3a Note: GHG Inventory and mitigation plan is eligible for CWSRF funding.
 - 4.2-3b EPA Climate Leaders: <http://www.epa.gov/climateleaders/basic/index.html>
Climate Registry: <http://www.theclimateregistry.org/>
- 4.2-4 Planning activities by a POTW to prepare for adaptation to the long-term effects of climate change and/or extreme weather.
 - 4.2-4a Office of Water – Climate Change and Water website:
<http://www.epa.gov/water/climatechange/>
- 4.2-5 Construction of US Building Council LEED certified buildings or renovation of an existing building on POTW facilities.
 - 4.2-5a Any level of certification (Platinum, Gold, Silver, Certified).

4.2-5b All building costs are eligible, not just stormwater, water efficiency and energy efficiency related costs. Costs are not limited to the incremental additional costs associated with LEED certified buildings.

4.2-5c U.S. Green Building Council website

<http://www.usgbc.org/displaypage.aspx?CategoryID=19>

4.2-6 Decentralized wastewater treatment solutions to existing deficient or failing onsite wastewater systems.

4.2-6a Decentralized wastewater systems include individual onsite and/or cluster wastewater systems used to collect, treat and disperse relatively small volumes of wastewater. An individual onsite wastewater treatment system is a system relying on natural processes and/or mechanical components, that is used to collect, treat and disperse or reclaim wastewater from a single dwelling or building. A cluster system is a wastewater collection and treatment system under some form of common ownership that collects wastewater from two or more dwellings or buildings and conveys it to a treatment and dispersal system located on a suitable site near the dwellings or buildings. Decentralized projects may include a combination of these systems. EPA recommends that decentralized systems be managed under a central management entity with enforceable program requirements, as stated in the *EPA Voluntary Management Guidelines*.

http://www.epa.gov/owm/septic/pubs/septic_guidelines.pdf

4.2-6b Treatment and Collection Options: A variety of treatment and collection options are available when implementing decentralized wastewater systems. They typically include a septic tank, although many configurations include additional treatment components following or in place of the septic tank, which provide for advanced treatment solutions. Most disperse treated effluent to the soil where further treatment occurs, utilizing either conventional soil absorption fields or alternative soil dispersal methods which provide advanced treatment. Those that discharge to streams, lakes, tributaries, and other water bodies require federal or state discharge permits (see below). Some systems promote water reuse/recycling, evaporation or wastewater uptake by plants. Some decentralized systems, particularly cluster or community systems, often utilize alternative methods of collection with small diameter pipes which can flow via gravity, pump, or siphon, including pressure sewers, vacuum sewers and small diameter gravity sewers. Alternative collection systems generally utilize piping that is less than 8 inches in diameter, or the minimum diameter allowed by the state if greater than 8 inches, with shallow burial and do not require manholes or lift stations. Septic tanks are typically installed at each building served or another location upstream of the final treatment and dispersal site.

Collection systems can transport raw sewage or septic tank effluent. Another popular dispersal option used today is subsurface drip infiltration. Package plants that discharge to the soil are generally considered decentralized, depending on the situation in which they are used. While not entirely inclusive, information on treatment and collection processes is described, in detail, in the “*Onsite Wastewater Treatment Technology Fact Sheets*” section of the EPA Onsite Manual http://www.epa.gov/owm/septic/pubs/septic_2002_osdm_all.pdf and on EPA’s septic system website under Technology Fact Sheets.

http://cfpub.epa.gov/owm/septic/septic.cfm?page_id=283

4.3 Projects That Do Not Meet the Definition of Environmentally Innovative

- 4.3-1 Air scrubbers to prevent nonpoint source deposition.
- 4.3-2 Facultative lagoons, even if integral to an innovative treatment processes.
- 4.3-3 Surface discharging decentralized wastewater systems where there are cost effective soil-based alternatives.
- 4.3-4 Higher sea walls to protect POTW from sea level rise.
- 4.3-5 Reflective roofs at POTW to combat heat island effect.

4.4 Decision Criteria for Business Cases

- 4.4-1 State programs are allowed flexibility in determining what projects qualify as innovative in their state based on unique geographical or climatological conditions.
 - 4.4-1a Technology or approach whose performance is expected to address water quality but the actual performance has not been demonstrated in the state;
 - 4.4-1b Technology or approach that is not widely used in the State, but does perform as well or better than conventional technology/approaches at lower cost; or
 - 4.4-1c Conventional technology or approaches that are used in a new application in the State.

4.5 Examples of Projects Requiring a Business Case

- 4.5-1 Constructed wetlands projects used for municipal wastewater treatment, polishing, and/or effluent disposal.
 - 4.5-1a Natural wetlands, as well as the restoration/enhancement of degraded wetlands, may not be used for wastewater treatment purposes and must comply with all regulatory/permitting requirements.
 - 4.5-1b Projects may not (further) degrade natural wetlands.
- 4.5-2 Projects or components of projects that result from total/integrated water resource management planning consistent with the decision criteria for environmentally innovative projects and that are Clean Water SRF eligible.
- 4.5-3 Projects that facilitate adaptation of POTWs to climate change identified by a carbon footprint assessment or climate adaptation study.
- 4.5-4 POTW upgrades or retrofits that remove phosphorus for beneficial use, such as biofuel production with algae.
- 4.5-5 Application of innovative treatment technologies or systems that improve environmental conditions and are consistent with the Decision Criteria for environmentally innovative projects such as:
 - 4.5-5a Projects that significantly reduce or eliminate the use of chemicals in wastewater treatment;
 - 4.5-5b Treatment technologies or approaches that significantly reduce the volume of residuals, minimize the generation of residuals, or lower the amount of chemicals in the residuals. (National Biosolids Partnership, 2010; *Advances in Solids Reduction Processes at Wastewater Treatment Facilities Webinar*; [- 4.5-5b\(i\) Includes composting, class A and other sustainable biosolids management approaches.](http://www.e-wef.org/timssnet/meetings/tnt_meetings.cfm?primary_id=10WCAP2&Action=LONG&subsystem=ORD%3cbr>)
- 4.5-6 Educational activities and demonstration projects for water or energy efficiency.

- 4.5-7 Projects that achieve the goals/objectives of utility asset management plans (http://www.epa.gov/safewater/smallsystems/pdfs/guide_smallsystems_assetmanagement_bestpractices.pdf; <http://www.epa.gov/owm/assetmanage/index.htm>).
- 4.5-8 Sub-surface land application of effluent and other means for ground water recharge, such as spray irrigation and overland flow.
 - 4.5-8a Spray irrigation and overland flow of effluent is not eligible for GPR where there is no other cost effective alternative.

Business Case Development

This guidance is intended to be comprehensive: however, EPA understands our examples projects requiring a business case may not be all inclusive. A business case is a due diligence document. For those projects, or portions of projects, which are not included in the categorical projects lists provided above, a business case will be required to demonstrate that an assistance recipient has thoroughly researched anticipated ‘green’ benefits of a project. Business cases will be approved by the State (see section III.A. in the *Procedures for Implementing Certain Provisions of EPA’s Fiscal Year 2010 Appropriation Affecting the Clean Water and Drinking Water State Revolving Fund Programs*). An approved business case must be included in the State’s project files and contain clear documentation that the project achieves identifiable and substantial benefits. The following sections provide guidelines for business case development.

5.0 Length of a Business Case

- 5.0-1 Business cases must address the decision criteria for the category of project
- 5.0-2 Business cases should be adequate, but not exhaustive.
 - 5.0-2a There are many formats and approaches. EPA does not require any specific one.
 - 5.0-2b Some projects will require detailed analysis and calculations, while others many not require more than one page.
 - 5.0-2c Limit the information contained in the business case to only the pertinent ‘green’ information needed to justify the project.
- 5.0-3 A business case can simply summarize results from, and then cite, existing documentation – such as engineering reports, water or energy audits, results of water system tests, etc.

5.1 Content of a Business Case

- 5.1-1 Quantifiable water and/or energy savings or water loss reduction for water and energy efficiency projects should be included.
- 5.1-2 The cost and financial benefit of the project should be included, along with the payback time period where applicable. (NOTE: Clean Water SRF requires energy efficiency projects to be cost effective.)

5.2 Items Which Strengthen Business Case, but Are Not Required

- 5.2-1 Showing that the project was designed to enable equipment to operate most efficiently.

5.2-2 Demonstrating that equipment will meet or exceed standards set by professional associations.

5.2-3 Including operator training or committing to utilizing existing tools such as Energy Star's Portfolio Manager or CUPSS for energy efficiency projects.

5.3 Example Business Cases Are Available at <http://www.srfbusinesscases.net/>.

Rod Geisler

From: Rance Walker
Sent: Friday, February 11, 2011 1:18 PM
To: Rod Geisler
Subject: FW: El Dorado Wind Turbine
Attachments: El Dorado Feasibility Study.pdf; Map of Wind Turbine proposed location 9-10-10.pdf; N1000 - Turbine Data Sheet -16APR09 - rev18.pdf; Nordic 1000 Specs.pdf

FYI

Rance Walker, P.E.
Kansas Department of Health and Environment
1000 SW Jackson Street, Suite 420
Topeka, Kansas 66612-1367

Phone: (785) 296-5537
Fax: (785) 296-0086
E-mail: rcwalker@kdheks.gov

From: Kurt Bookout [<mailto:wildcat@eldoks.com>]
Sent: Friday, February 11, 2011 11:40 AM
To: Rance Walker
Cc: 'Brett Perry'; 'Kurt Bookout'; 'Jason Patty'
Subject: El Dorado Wind Turbine

Rance,
Attached are several documents that will give you an overview of the project. Please let me know if there is anything else you need to help you make your determination.
Below is an overview of the Payback Analysis.

Summary: We will spend between \$3.5 and \$4.5 million in energy costs to run the wastewater facility over the next 20 years if we do not build a wind turbine and continue to purchase electricity from Westar. It appears, the 20-year investment for a wind turbine is about \$2.23 million. The 1 MW turbine will supply about 125% of the electricity we need to run our facility when the wind is blowing. Excess electricity will be sold back to Westar. Depending on the rate of escalation of energy costs, the payback could be 8 years or could be 15 years. The wind turbine manufacturer we have chosen, Nordic Windpower, have a excellent track record and have many turbines in Europe that have been running for 22 years without any major investment in maintenance. The technology they are using today is better and our consultant feels the turbines they are installing today could easily have a useful life of 30+ years.

\$2,223,650 - Engineer's Estimate for Turbine, Design and Construction Costs
\$9,850 - Feasibility Study
(\$250,000) - Dept. of Energy Grant
(\$100,000) - Green Energy Credits
\$1,883,500 Total

\$17,500 x 20 years Annual O&M
= \$350,000 20 year O&M

\$1,883,500 Net Capital Investment
+ \$350,000 O&M Costs

\$2,233,500 20-year investment cost

Cumulative Westar Energy Bills at El Dorado Wetlands and Water Reclamation Facility at various escalation rates

Length of Time	0.0%	2.5%	5.0%	7.5%
15 yrs	\$2,025,000	\$2,420,810	\$2,913,106	\$3,525,9
20 yrs	\$2,700,000	\$3,448,529	\$4,463,904	\$5,846,1

VS. \$2,233,500 20-Year Wind Turbine Investment Cost

Kurt Bookout

Director of Public Utilities

105 Wetlands Drive, El Dorado, KS 67042

316-322-4980

"When the well is dry, we know the worth of water"

- Benjamin Franklin

WIND SAVINGS CALCULATOR



architects
engineers

9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbateam.com

4/1/2011

Avg. Wind Speed	7.00	meters/second	at	55	meters AGL
First Year Energy Cost		cents/kwh			
Escalation Rate for Electricity	6	percent/year		Project:	
Inflation Rate	2	percent/year		El Dorado	

	Nordic N1000			
Installed Cost	\$ 2,220,000			
Fixed O&M Costs	\$ 35,000			
Hub Height (m)	70			
Avg. Wind Speed at Hub (m/s)	7.24			
Est. Energy Produced (kWh/yr)	2,484,136			
Capacity Factor	28.3%			
Energy Cost Saved in 1st Year	\$ 138,675			
Est. Energy Produced Over 20 Years (kWh)	49,682,711			
Total Energy Cost Savings Over 20 Years	\$ 4,912,527			
20-Year Project Net Present Value	\$ 702,147			
Est. Payback Year	14			

Calculations are based on manufacturers' published power curves, air density of 1.225 kg/m³, and Rayleigh wind distribution.

Turbine Performance

	Nordic N1000	0	0	0
Availability	96%			
System losses	5%			
Wind shear exponent	0.14			
Output depreciation /yr				

Financing

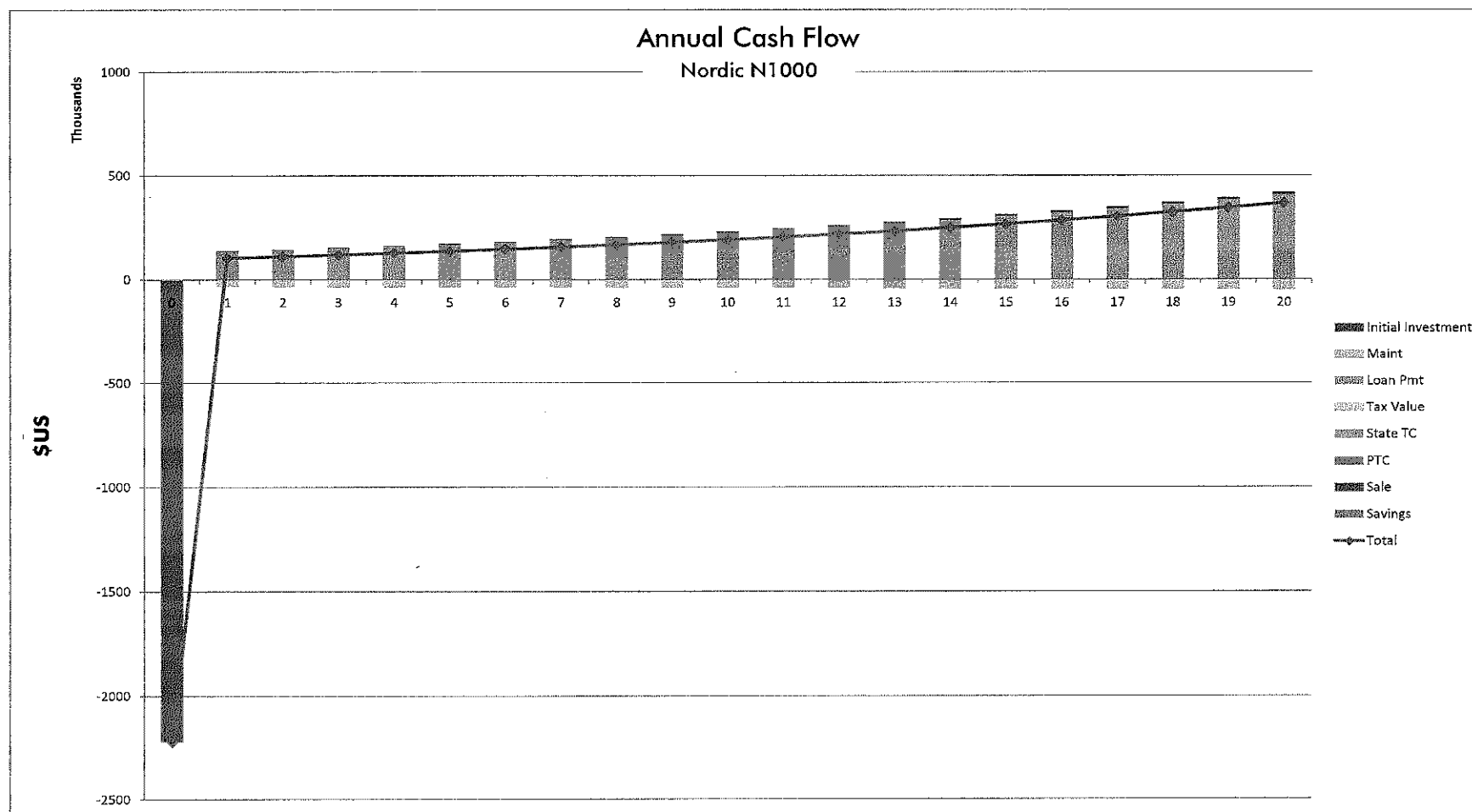
Investment Tax Credit / Grant
 Production Tax Credit (\$/kWh)
 Production Tax Credit escalation
 Annual State Tax Credit
 Loan amount
 Loan term (yrs)
 Loan interest rate
 Depreciation method
 Effective marginal tax rate
 Discount rate

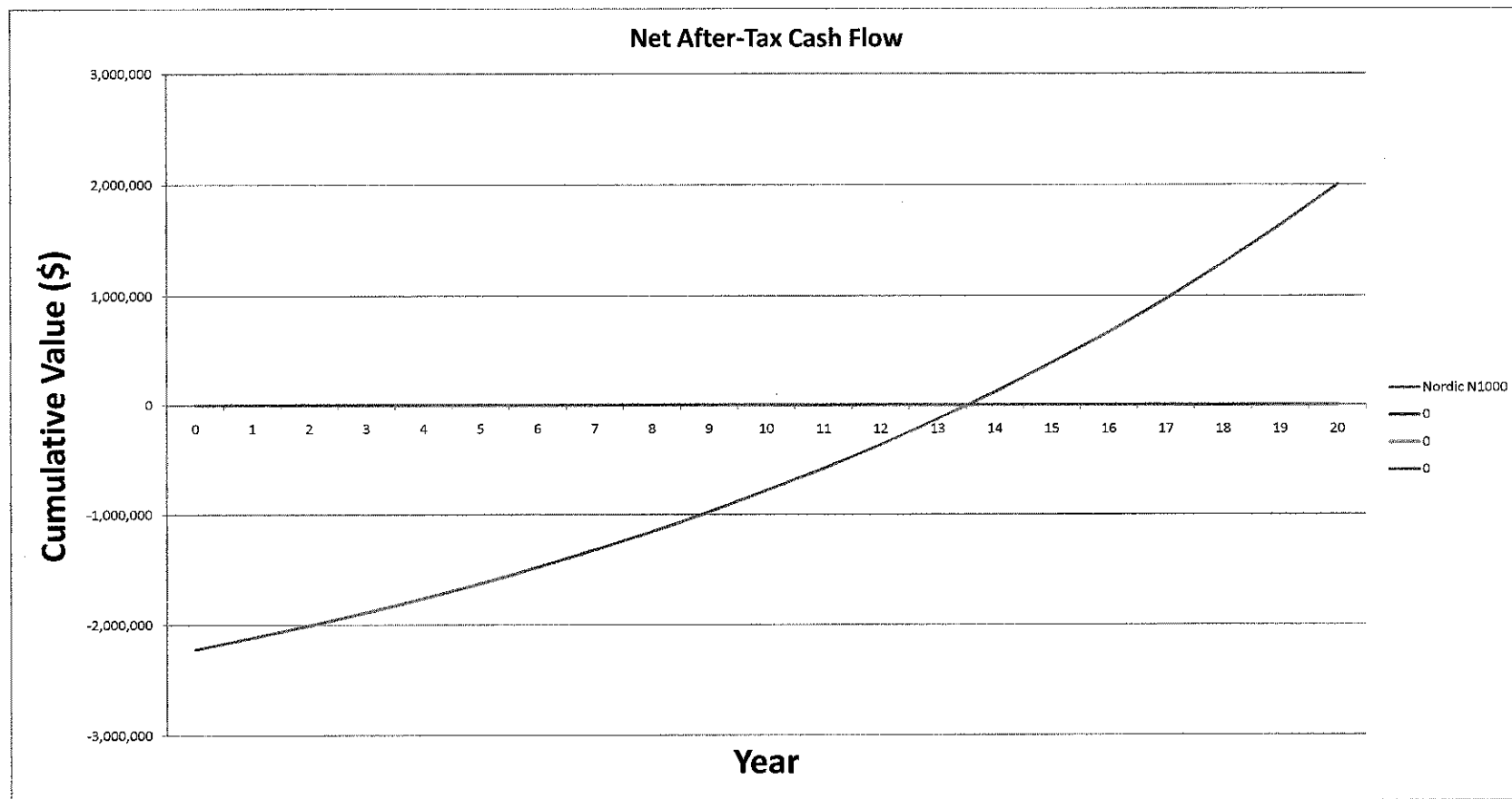
None	
3%	

Energy Billing

Month Usage	Energy Usage (kWh)
January	230,100
February	194,100
March	190,500
April	195,900
May	194,100
June	202,500
July	195,900
August	167,100
September	196,300
October	171,000
November	157,500
December	218,100

	Summer		Winter	
Energy purchase rates	kWh	\$/kWh	kWh	\$/kWh
First block	1,000,000	0.0586	1,000,000	0.0586
2nd block				
3rd block				
Excess				
Summer starts	June			
Summer ends	September			
Net period	Annual			
Sell-back rate	0.0250	\$/kWh		
REC value		\$/kWh		
REC escalation		/yr		



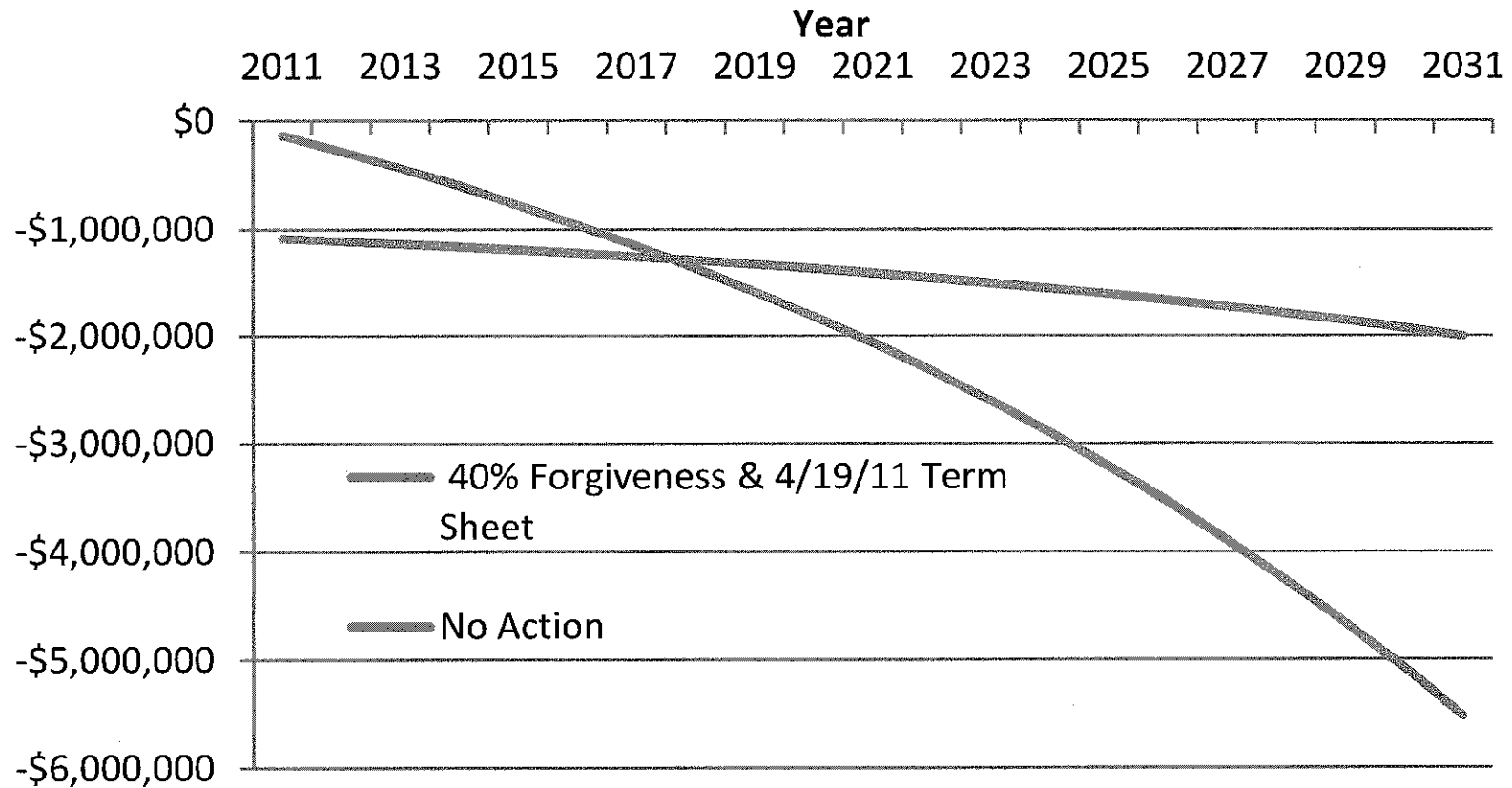


Nordic N1000

Yr	Savings	Sale	PTC	Interest	Deprec	State TC	Tax Value	Loan Pmt	Maint	Cash	Cumulative
0										-2220000	-2220000
1	133545	4276	0	0	0	0	0	0	-35000	102821	-2117179
2	141558	4532	0	0	0	0	0	0	-35700	110390	-2006789
3	150051	4804	0	0	0	0	0	0	-36414	118441	-1888348
4	159054	5093	0	0	0	0	0	0	-37142	127004	-1761343
5	168597	5398	0	0	0	0	0	0	-37885	136110	-1625233
6	178713	5722	0	0	0	0	0	0	-38643	145792	-1479441
7	189436	6065	0	0		0	0	0	-39416	156086	-1323355
8	200802	6429	0	0		0	0	0	-40204	167027	-1156327
9	212850	6815	0	0		0	0	0	-41008	178657	-977670
10	225621	7224	0	0		0	0	0	-41828	191017	-786653
11	239159	7657		0			0	0	-42665	204151	-582502
12	253508	8117		0			0	0	-43518	218107	-364395
13	268719	8604		0			0	0	-44388	232934	-131461
14	284842	9120		0			0	0	-45276	248686	117224
15	301932	9667		0			0	0	-46182	265418	382642
16	320048	10247		0			0	0	-47105	283190	665832
17	339251	10862		0			0	0	-48047	302066	967898
18	359606	11514		0			0	0	-49008	322112	1290009
19	381182	12205		0			0	0	-49989	343399	1633408
20	404053	12937		0			0	0	-50988	366002	1999410
21	428296	13713		0			0	0	-52008	390002	2389412
22	453994	14536		0			0	0	-53048	415482	2804894
23	481234	15408		0			0	0	-54109	442533	3247427
24	510108	16333		0			0	0	-55191	471249	3718676
25	540714	17313		0			0	0	-56295	501732	4220408
26	573157	18352		0			0	0	-57421	534088	4754495
27	607547	19453		0			0	0	-58570	568430	5322925
28	644000	20620		0			0	0	-59741	604878	5927804
29	682640	21857		0			0	0	-60936	643561	6571364
30	723598	23168		0			0	0	-62155	684612	7255976

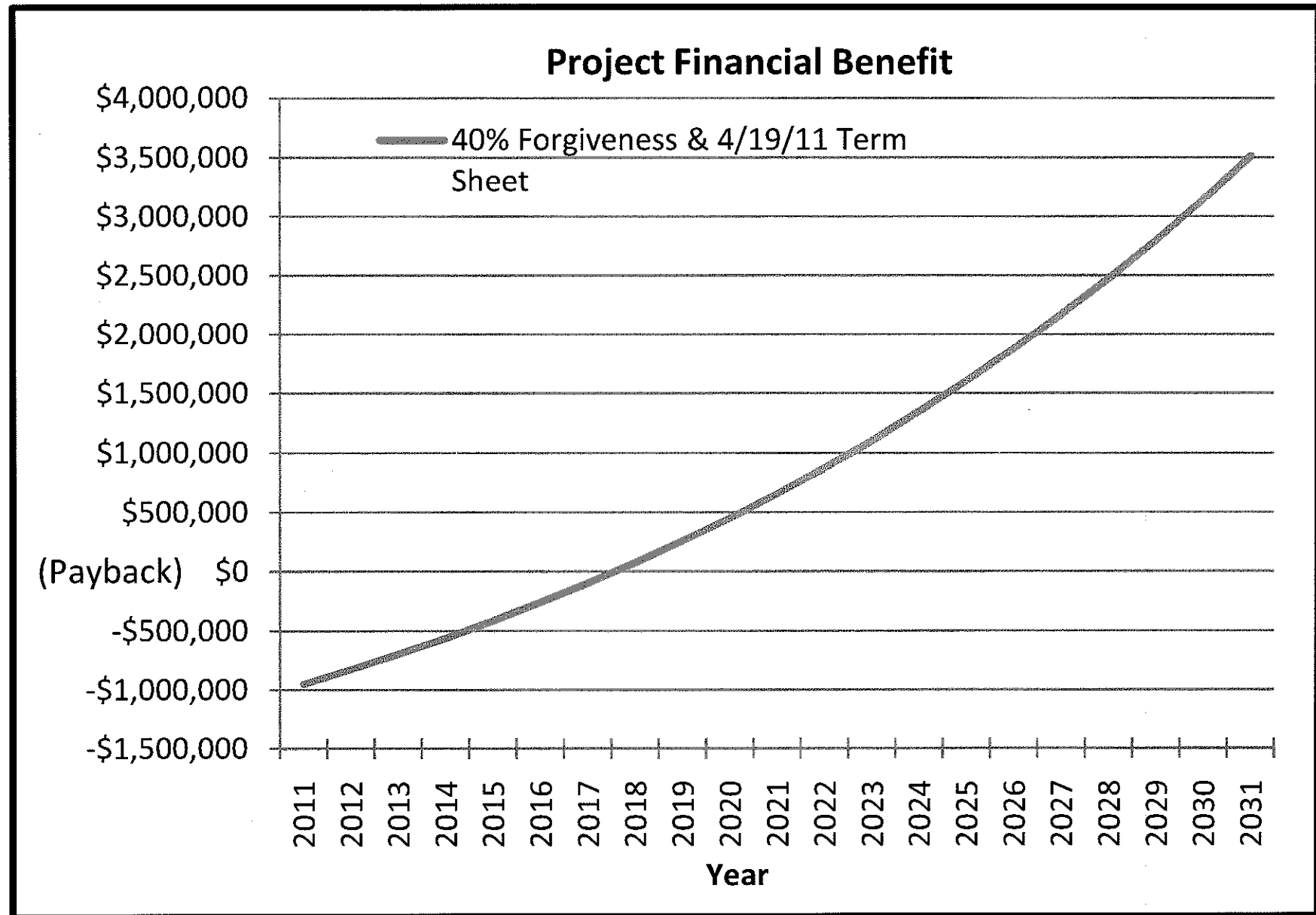
Net present Value:	702147
Payback Year	14
IRR	6%

Month	Energy					
	Energy Usage (kWh)	Net Energy output (kWh)	Energy Purchase Reduction (kWh)	Energy Purchase cost reduction (\$)	Monthly Net Excess Gen (kWh)	N.E.G. Sellback Value (\$)
1	230100	207011	207011	12131	0	0
2	194100	207011	194100	11374	12911	323
3	190500	207011	190500	11163	16511	413
4	195900	207011	195900	11480	11111	278
5	194100	207011	194100	11374	12911	323
6	202500	207011	202500	11867	4511	113
7	195900	207011	195900	11480	11111	278
8	167100	207011	167100	9792	39911	998
9	196300	207011	196300	11503	10711	268
10	171000	207011	171000	10021	36011	900
11	157500	207011	157500	9230	49511	1238
12	218100	207011	207011	12131	0	0
	2313100	2484136	2278923	133545	205213	5130
Annual net excess generation:					171036	4276



Cumulative Electricity Bill

In Kansas, every mega watt (MW) of renewable energy installed will prevent approximately 1,750 metric tons of carbon dioxide from being released into the atmosphere every year. This is equivalent to the emissions from 334 passenger vehicles.



Estimated monthly activity for one 1MW Nordic Wind Turbine

	Total Energy Usage (MWh)	Wind Energy produced (MWh)	Wind Energy net excess gen. (MWh)	Wind Energy net excess gen. (\$)	Energy from Utility (MWh)	Energy from Utility (\$)
January	230.1	207.0	0.0	\$0	23.1	\$1,388
February	194.1	206.9	12.8	\$370	0.0	\$0
March	190.5	222.5	32.0	\$927	0.0	\$0
April	195.9	238.3	42.4	\$1,230	0.0	\$0
May	194.1	217.8	23.7	\$687	0.0	\$0
June	202.5	206.9	4.4	\$126	0.0	\$0
July	195.9	185.0	0.0	\$0	10.9	\$656
August	167.1	175.5	8.4	\$244	0.0	\$0
September	196.3	195.8	0.0	\$0	0.5	\$29
October	171.0	216.3	45.3	\$1,314	0.0	\$0
November	157.5	210.0	52.5	\$1,521	0.0	\$0
December	218.1	214.6	0.0	\$0	3.5	\$209
Annual	2,313	2,496	221	\$6,420	38	\$2,282
	Annual Net Excess Gen.		183	\$4,138		

EL DORADO WATER RECLAMATION FACILITY WIND TURBINE

PLAN OF OPERATION

The 1 MW wind turbine is estimated to generate electricity about 35% of the time. The 1 MW of production is based on this assumption, so the turbine basically overproduces when it is generating power. The excess power will be sold back through the meter to the electric utility (Westar). At the end of each month the amount of excess power produced will be subtracted from the amount of power consumed from the utility “settled up” and the City will either pay Westar or Westar will pay the City, depending on the quantity of generation for that month. The table “Monthly Usage vs. Generation table” illustrates what our consultant believes will occur over the duration of a year, based on the “Term Sheet” offered by Westar.

The wind turbine SCADA system will monitor all critical operating parameters of the wind turbine, including:

	SCADA Feature	Comment
1	Customer\Operator can monitor the turbine remotely with limited commands(Start, Reset & Stop)	Operator\Customer can monitor the turbine related datapoints such as..power, windspeed, temperature, etc.
2	Easy HMI deployment	Available on browser..simply write website url and it will show the SCADA HMI.
3	Turbine data available in Trends(graph)	Operator\Customer can visualize turbine data in graphical format
4	SCADA System automatically emails turbine reports to Customer	Customer will get his turbine reports (Turbine Performance, Turbine Fault, Power Curve, etc.) in email on daily\weekly\monthly basis
5	Turbine alarms & status available on mobile and in email	Customer\Operator will get turbine information such as alarms, status on mobile phone thru SMS and also get same information thru email

All power produced will be monitored and recorded allowing the City to monitor where the power is being used, imported or exported.

Operation and Maintenance

The first two years of O&M are covered under the Nordic Total Care Plan for a fee of \$20,000 per year. This covers all maintenance, replacement parts, transportation, labor, crane rental etc. This is effectively their "bumper to bumper" warranty program. In years 3-5 you can opt for the basic care plan at a cost of \$17,500 per year, which covers all maintenance, but any repairs are at the owner's expense. Or, you can continue the Total Care Program at a cost of \$34,000 per year. The City of El Dorado is leaning towards the Total Care Plan, but can wait until the second year to make that decision.

(Non-Inverter Based Generation and Inverter Based Generation > 25 kW)

An application is complete when it provides all applicable information required below and any required application fee. A one-line diagram and a load flow data sheet must be supplied with this application. Additional information to evaluate a request for interconnection may be required after an application is deemed complete.

Applicant requests review under (select one):

 X Non-Inverted Based Generation Inverter Based Generation > 25 kW

1.0 Applicant Information

Legal Name of Applicant (if an individual, individual's full name)

Name: Kurt Bookout (Director of Public Utilities)

Address: 105 Wetlands Drive

City, State, Zip: El Dorado, KS 67042

Telephone (Day): 316.322.4980 (Evening): Fax: 316.321.6282 E-Mail Address: wildcat@eldoks.com

Type of interconnection (Choose one):

- ☒ Qualified Net Metering
- ☐ Load Response (no export)
- ☐ Wholesale Provider

Westar Customer Account Number (for Generating Facilities at Owner locations): 2526367502

2.0 Generating Facilities Specifications

Prime Mover: Photovoltaic / Reciprocating Engine / Fuel Cell / Gas Turbine / Steam Turbine /

Microturbine / Other (specify) One Wind Turbine (1MW)

Energy Source: Solar / Wind / Hydro (state type i.e. Run of River) / Diesel / Natural Gas / Fuel Oil / Other (state type)

Type of Generating Facility: ☐ Inverter ☐ Synchronous ☒ Induction Generating Facility

Nameplate Rating: 1,000 kW Applicant Site Load: 495 kW (February demand)

Typical Reactive Load (if know): Not Known

Maximum Physical Export Capability Requested: 1,000 kW

List components of the interconnection Equipment Package that are UL listed or IEEE certified:

Equipment Type

Certifying Entity

1 Wind turbine output circuit breaker – UL / IEC

2

3

Is the prime mover compatible with the Interconnection Equipment Package? Yes No

Individual generator data (attach additional sheets if needed)

Manufacturer, Model Name & Number: Nordic Wind Power Nordic, N1000

Version Number: N1000-59-70

Nameplate Output Power Rating in kW: 1,000 Nameplate Output Power Rating in kVA: 1,110

Rated Power Factor: .90 (Lagging)

Total Number of generators to be interconnected pursuant to this Application One

Elevation: 1,270 ft (Ground)

Single phase: Three phase; (check one)

List of adjustable set points for the protective equipment or software:

	Trip condition	Reset
Vector Surge	Vector surge of > 45 deg for 100 ms	Auto reset after trip condition is removed for 3 min
Voltage High	Any L-N voltage > 20% higher than nominal (690 V) for 100 ms	Auto reset after trip condition is removed for 3 min
Voltage Low	Any L-N voltage > 12.5% lower than nominal (690 V) for 100 ms	Auto reset after trip condition is removed for 3 min
Frequency High	Frequency > 1.5 Hz higher than nominal (60 Hz) for 100 ms	Auto reset after trip condition is removed for 3 min
Frequency Low	Frequency > 1.5 Hz lower than nominal (60 Hz) for 100 ms	Auto reset after trip condition is removed for 3 min
Current Asymmetry	Current deviation of > 10% in one phase for 100 ms	Auto reset after trip condition is removed for 3 min
Voltage Asymmetry	L-L voltage deviation of > 5% for 100 ms	Auto reset after trip condition is removed for 3 min

Inverter based Generating Facilities none

Inverter Manufacturer, Model Name & Number: Max design fault current contribution (choose one):

Asymmetrical Amps

Symmetrical Amps

Harmonics

Characteristics:

Start-up requirements:

Rotating Machines (of any type)

RPM Frequency: 60 Hz

(*) Neutral Grounding resistor (If Applicable): N/A

Synchronous Generators N/A

Direct Axis Synchronous Reactance, X_d : P.U.

Direct Axis Transient Reactance, X'_d : P.U.

Direct Axis Sub transient Reactance X''_d : P.U.

Negative Sequence Reactance, X_2 : P.U.

Zero Sequence Reactance, X_0 : P.U.

kVA Base:

Field Volts:

Field Amperes:

For synchronous generators, provide appropriate IEEE model block diagram of excitation system, governor system, and power system stabilizer (PSS in accordance with the Regional Reliability Council criteria. A PSS may be determined to be required by applicable studies. A copy of the manufacturer's block diagram may not be substituted.

Induction Generators

Motoring Power (kW): 720 kVA

I^2 or K (Heating Time Constant): unknown

Rotor Resistance, R_r : 0.0438 ohm

Rotor Reactance, X_r : 0.123 ohm

Stator Resistance, R_s : 0.00624 ohm

Stator Reactance, X_s : 0.0648 ohm

Magnetizing Reactance, X_m : 4.0721 ohm

Short Circuit Reactance, X_d : $X''_d=0.103$ pu

Exciting Current: unknown

Temperature Rise: Class B

Frame Size: YFLS 450L -4

Design Letter: unknown

Reactive Power Required In Vars (No Load): 345 kVAR

Reactive Power Required in Vars (Full Load): 485 kVAR

Total Rotating Inertia, H: 0.23 Per Unit on kVA Base

3.0 Transformer and Protective Relay Specifications

Will a transformer be used between the generator and the Facility Connection? Yes No

Will the transformer be provided by the Owner? ? Yes No

Transformer: percent on kVA Base If Three Phase: 1,500 kVA

Transformer Primary: 12,470 Volts _____ Delta _____ Wye X Wye Grounded

Transformer Secondary: 690 Volts _____ Delta _____ Wye X Wye Grounded

Transformer Tertiary: N/A Volts _____ Delta _____ Wye _____ Wye Grounded

Transformer Fuse Data: (if applicable, for Owner's fuse)

(Attach copy of fuse manufacturer's Minimum Melt and Total Clearing Time-Current Curves)

Manufacturer: Type: Bay-O-Net
(tentative)

Size: 140A
(tentative)

Speed: 353C17
(tentative)

Interconnecting Circuit Breaker: (if Applicable)

Manufacturer: ABB

Type: T7H 1250A MCCB

Load Rating (Amps): 1250 Interrupting Rating (Amps) 30 kA Trip Speed (Cycles) TBD

Interconnection Protective Relays: (if applicable)

If Microprocessor-Controlled: DEIF AGC 200

List of Functions and Adjustable Set points for the protective equipment or software:

Trip condition		Reset
Vector Surge	Vector surge of > 45 deg for 100 ms	Auto reset after trip condition is removed for 3 min
Voltage High	Any L-N voltage > 20% higher than nominal (690 V) for 1000 ms	Auto reset after trip condition is removed for 3 min
Voltage Low	Any L-N voltage > 12.5% lower than nominal (690 V) for 100 ms	Auto reset after trip condition is removed for 3 min
Frequency High	Frequency > 1.5 Hz higher than nominal (60 Hz) for 100 ms	Auto reset after trip condition is removed for 3 min
Frequency Low	Frequency > 1.5 Hz lower than nominal (60 Hz) for 100 ms	Auto reset after trip condition is removed for 3 min
Current Asymmetry	Current deviation of > 10% in one phase for 100 ms	Auto reset after trip condition is removed for 3 min
Voltage Asymmetry	L-L voltage deviation of > 5% for 100 ms	Auto reset after trip condition is removed for 3 min

Set point Function

Minimum

Maximum

Discrete Components: (if applicable) N/A

(Enclose Copy of any Proposed Time-Overcurrent Coordination Curves)

Manufacturer: _____ Type: _____ Style/Catalog No: _____

Proposed Setting: _____

Manufacturer: _____ Type: _____ Style/Catalog No: _____

Proposed Setting: _____

Current Transformer Data: (if applicable)

(Enclose Copy of Manufacturer's Excitation and Ratio Correction Curves) Manufacturer:

Type: Noratec 4-083-001133 Accuracy Class: unknown Proposed Ratio Connection: 1200:1

Potential Transformer Data: (if applicable) N/A

Manufacturer:

Type: _____ Accuracy Class: _____ Proposed Ratio Connection: _____

4.0 General Information

Enclose copy of site electrical one-line diagram showing the configuration of all Generating Facility Equipment, current and potential circuits, and protection and control schemes. This one-line diagram must be signed and stamped by a licensed Professional Engineer if the Generating Facility is larger than 200 kW.

Is one-line diagram enclosed? X Yes _____ No

Enclose copy of any site documentation that indicates the precise physical location of the proposed Generating Facility and all protective equipment (e.g., USGS topographic map or other diagram or documentation).

Is site documentation enclosed? X Yes _____ No

Enclose copy of any site documentation that describes and details the operation of the protection and control schemes.

Is available documentation enclosed? X Yes _____ No

Enclose copies of schematic drawings for all protection and control circuits, relay current circuits, relay potential circuits, and alarm/monitoring circuits (if applicable).

Are schematic drawings enclosed? X Yes _____ No

5.0 Applicant Signature

I hereby certify that to the best of my knowledge, all the information provided in this Facility Connection Standard Application is true and correct. Generating Facilities must be compliant with IEEE, NEC, ANSI, and UL standards, where applicable. By signing below, the Applicant also certifies that the installed generating equipment meets the appropriate proceeding requirement(s) and can supply documentation that confirms compliance.

Signature of Applicant: _____

Date: _____

Kurt Bookout



SUZANNE COIN
Business Manager
Commercial & Industrial Business Center

December 29, 2011

Mr. Kurt Bookout
City of El Dorado
220 East 1st Street
El Dorado, KS 67042

Dear Kurt,

Enclosed is an original of the fully executed Renewable Energy Purchase Agreement between the City of El Dorado and Kansas Gas and Electric Company dba Westar Energy Inc. dated December 28, 2011.

We look forward to working with you on this project. Please do not hesitate to contact me if we can help further.

Best regards,



Enclosure

RENEWABLE ENERGY PURCHASE AGREEMENT

BETWEEN

CITY OF EL DORADO

AND

KANSAS GAS AND ELECTRIC COMPANY

d/b/a

WESTAR ENERGY, INC.

EXHIBITS

Exhibit A	Construction Milestones
Exhibit B	Facility Description and Site Maps
Exhibit C	Notice Addresses

RENEWABLE ENERGY PURCHASE AGREEMENT

This Renewable Energy Purchase Agreement (this "Agreement") is executed this 28th day of December, 2011, and shall become effective on the Effective Date, by and between the City of El Dorado ("City") and Kansas Gas and Electric Company, a Kansas Corporation doing business as Westar Energy, Inc. ("Westar"), with a principal place of business at 818 South Kansas Avenue, Topeka, Kansas 66612. City and Westar are hereinafter referred to individually as a "Party" and collectively as the "Parties".

WHEREAS City desires to develop, design, construct, own and operate a renewable electric generating facility with an expected total nameplate capacity of approximately 1 MW, and which is further defined below as the "Facility"; and

WHEREAS City intends to locate the Facility at the location outlined in Exhibit B (the "Location"); and

WHEREAS City desires to sell and deliver to Westar all Renewable Energy produced by the Facility that is delivered to the Point of Delivery as well as all associated Environmental and Renewable Energy Credits produced by the generation of Renewable Energy at the Facility (whether or not the Renewable Energy is consumed at the Location or delivered to the Point of Delivery), and Westar desires to buy the same from City.

NOW THEREFORE, in consideration of the mutual covenants herein contained, the sufficiency and adequacy of which are hereby acknowledged, the Parties agree to the following:

ARTICLE 1

Definitions and Rules of Interpretation

Section 1.01 Rules of Construction. The capitalized terms listed in this Article 1 shall have the meanings set forth herein whenever the terms appear in this Agreement, whether in the singular or the plural or in the present or past tense. Other terms used in this Agreement but not listed in this Article 1 shall have meanings as commonly used in the English language and, where applicable, in Good Utility Practice. Words not otherwise defined herein that have well known and generally accepted technical or trade meanings are used herein in accordance with such recognized meanings. In addition, the following rules of interpretation shall apply:

- (a) The masculine shall include the feminine and neuter.

(b) The words "herein," "hereof" and "hereunder" and words of similar import when used in this Agreement shall, unless otherwise expressly specified, refer to this Agreement as a whole and not to any particular provision of this Agreement. Unless otherwise specified, references to "Articles," "Sections," or "Exhibits" shall be to articles, sections, or exhibits of this Agreement.

(c) The Exhibits attached hereto are incorporated in and are intended to be a part of this Agreement; provided, that in the event of a conflict between the terms of any Exhibit and the terms of this Agreement, the terms of this Agreement shall prevail.

(d) The term "knowledge", and any other similar expressions, shall mean knowledge after due inquiry.

(e) The words "include," "includes" and "including" are not limiting.

(f) This Agreement was negotiated and prepared by both Parties with the advice and participation of counsel. The Parties have agreed to the wording of this Agreement and none of the provisions hereof shall be construed against one Party on the ground that such Party is the author of this Agreement or any part hereof.

(g) The Parties shall act reasonably and in accordance with the principles of good faith and fair dealing in the performance of this Agreement. Unless expressly provided otherwise in this Agreement, (i) where this Agreement requires the consent, approval, or similar action by a Party, such consent, approval or similar action shall not be unreasonably withheld, conditioned or delayed, and (ii) wherever this Agreement gives a Party a right to determine, require, specify or take similar action with respect to a matter, such determination, requirement, specification or similar action shall be reasonable.

Section 1.02 Interpretation of Arrangements for Electric Supply to the Facility.

(a) The Parties recognize that this particular Agreement does not provide for the supply of any electric service by Westar to City or to the Facility and City must enter into separate arrangements for the supply of electric services to the Facility, including the supply of turbine unit start-up and shutdown house power and energy.

(b) The Parties acknowledge and agree that the arrangements for the supply of electric services to the Facility shall be separate and free-standing arrangements and that the terms of this Agreement are not binding upon the supplier of such electric services. There will be no kWh "banking" or other payment or consumption netting between Renewable Energy purchased by Westar under this Agreement and the sale of any electrical services to City.

(c) Notwithstanding any other provision in this Agreement, nothing in the arrangements for the supply of retail electric services to the Facility shall alter or modify City's or Westar's rights, duties and obligations under this Agreement. This Agreement shall not be construed to create any rights between City and the supplier of such retail electric services.

Section 1.03 Definitions. The following terms shall have the meanings set forth herein:

"Abandonment" means (i) the relinquishment of all possession and control of the Facility by City (not including any period during which the Facility is not operating for maintenance, repair, refurbishment or repowering), other than a transfer permitted under this Agreement, or (ii) if prior to the Commercial Operation Date, complete cessation of the design, construction, testing and inspection of the Facility, in either case, for thirty (30) consecutive Days by City and City's contractors, but only if such relinquishment or cessation is not caused by or attributable to a breach of this Agreement by Westar or an event of Force Majeure.

"Affiliate" of any named person or entity means any other person or entity that controls, is under the control of, or is under common control with, the named entity. The term "control" (including the terms "controls", "under the control of" and "under common control with") means the possession, directly or indirectly, of the power to direct or cause the direction of the management of the policies of a person or entity, whether through ownership interest, by contract or otherwise. For purposes of this definition of Affiliate, the direct or indirect ownership of fifty percent (50%) or more of the outstanding capital stock or other equity interests of any person having ordinary voting power shall be deemed to be "control".

"Business Day" means any calendar day that is not a Saturday, a Sunday, a holiday on which banks in the State of Kansas are permitted to close, or a NERC recognized holiday.

"Change in Market Design" means one or more Kansas laws, rules or regulations has been introduced, amended or repealed and such change has a material adverse impact on either Party after the date hereof.

"City's Back-Up Metering" shall have the meaning provided in Section 5.02(b).

"City's Interconnection Facilities" means all equipment (as identified in Exhibit B) up to the Point of Delivery, including all related relaying protection and physical structures along with any easements, rights of way, surface use agreements and other interests or rights in real estate reasonably necessary for the construction, operation and maintenance of such facilities.

"Close of the Business Day" means 5:00 PM Central Prevailing Time on a Business Day.

"Commercial Operation" means the period beginning on the Commercial Operation Date and continuing through the Term of this Agreement.

"Commercial Operation Date" or "COD" means the date of City's declaration pursuant to Section 4.04 that all of the Conditions specified in Section 4.04 have occurred or otherwise been satisfied.

"Commercial Operation Year" means any consecutive twelve (12) month period during the Term of this Agreement, commencing with the Commercial Operation Date or any of

its anniversaries.

"Committed Renewable Energy" shall have the meaning provided in Section 7.02.

"Conditions" shall have the meaning provided in Section 4.04.

"Costs" means, with respect to a non-defaulting Party after terminating this Agreement in accordance with Section 10.04, brokerage fees, commissions and other similar third party transaction costs and expenses reasonably incurred and documented by such Party either in terminating any arrangement pursuant to which it has hedged its obligations hereunder or entering into new arrangements to replace this Agreement; and all reasonable attorneys' fees and expenses incurred by the non-defaulting Party in connection with the termination of this Agreement.

"Day" means a calendar day.

"Default Interest Rate" means the amount prescribed in 18 C.F.R. § 35.19a.

"Dispute" shall have the meaning provided in Section 11.07(a).

"Dispute Notice" shall have the meaning provided in Section 11.07(a).

"Early Termination Date" shall have the meaning provided in Section 10.04.

"Electric Metering Device(s)" means all Westar owned meters, metering equipment, and data processing equipment used to measure, record, or transmit data relating to the Renewable Energy output from the Facility. Electric Metering Devices include the metering current transformers ("CTs") and the metering voltage transformers ("VTs").

"Emergency" means an emergency condition that could reasonably be expected to: (i) adversely affect the reliability of the Westar system or generation supply; (ii) adversely affect the reliability of any interconnected system such as SPP; or (iii) otherwise pose a threat to Westar personnel or public safety.

"Environmental and Renewable Energy Credits" means any and all renewable energy credits, so-called "green tags", environmental air quality or greenhouse gas credits, carbon credits, off-sets or other environmental benefits related to the generation of energy at the Facility of every type and kind, whether or not pursuant to any federal, state or local legislation, directive, or regulation, any green pricing program or other environmental or renewable energy credit trading program derived from the use, purchase or distribution of Renewable Energy from the generation of energy at the Facility or any similar program pursuant to any federal, state or local legislation or regulation and any renewable energy certificates issued pursuant to any program, information system or tracking system associated with the Renewable Energy generated from the Facility. Environmental and Renewable Energy Credits do not include PTCs, ITCs, ITC Grants or other tax incentives, or grant in lieu of any of the foregoing.

"Environmental Laws" means all Laws applicable to the Site or the Facility

relating to pollution or protection of human health, safety or the environment (including ambient air, surface water, ground water, land surface or subsurface strata), including Laws relating to emissions, discharges, releases or threatened releases of Hazardous Materials, or otherwise applicable to the Site or the Facility relating to the manufacture, processing, distribution, use, treatment, storage, disposal, transport or handling of Hazardous Materials.

"Event of Default" shall have the meaning provided in Article 10.

"Facility" means City's renewable electric generating facility as identified and described in Article 3 and Exhibit B, including all of the following, the purpose of which is to produce renewable electricity and deliver such electricity to the Point of Delivery: City's equipment, buildings, all of the generation facilities, including generators, turbines, output breakers, facilities necessary to delivery Renewable Energy to the Point of Delivery, protective and associated equipment, improvements, and other tangible assets, contract rights, easements, rights of way, surface use agreements and other interests or rights in real estate reasonably necessary for the construction, operation, and maintenance of the electric generating facility that produces the Renewable Energy subject to this Agreement.

"FERC" means the Federal Energy Regulatory Commission or any successor agency.

"First Party" shall have the meaning provided in Section 17.06(b).

"Force Majeure" shall have the meaning provided in Article 12.

"Forced Outage" means any condition at the Facility that requires unplanned removal of the Facility from service, another outage state, or a reserve shutdown state. This type of outage results from unplanned mechanical/electrical/hydraulic control system shutdowns and operator-initiated shutdowns in response to Facility conditions and/or alarms which shall last longer than 48 consecutive hours.

"Gains" means, with respect to any Party, an amount equal to the present value of the economic benefit to it, if any (exclusive of Costs), resulting from the termination of this Agreement for the remaining Term of this Agreement, determined in a commercially reasonable manner.

"Generally Accepted Accounting Principles" means generally accepted accounting principles in the United States of America, or the corresponding accounting rules applicable to municipal and governmental entities in the United States of America.

"Good Utility Practice(s)" means the practices, methods, and acts engaged in or approved by a significant portion of the wind power generation industry in the United States that, at a particular time, in the exercise of reasonable judgment in light of the facts known or that should reasonably have been known at the time a decision was made, would have been expected to accomplish the desired result in a manner consistent with applicable Laws, standards, equipment manufacturer's recommendations, reliability, safety, environmental protection, economy, and expedition. With respect to the Facility, Good Utility Practice(s) includes, but is not limited to, taking reasonable steps to ensure that:

(a) equipment, materials, resources, and supplies, including spare parts inventories, are available to meet the Facility's needs;

(b) sufficient operating personnel are available at all times and are adequately experienced and trained and licensed as necessary to operate the Facility properly, efficiently and are capable of responding to reasonably foreseeable Emergency conditions whether caused by events on or off the Site;

(c) preventive, routine, and non-routine maintenance and repairs are performed on a basis that ensures reliable, long-term and safe operation, and are performed by knowledgeable, trained and experienced personnel utilizing proper equipment and tools;

(d) appropriate monitoring and testing are performed to ensure equipment is functioning as designed; and

(e) equipment is not operated in a reckless manner, in violation of manufacturer's guidelines or in a manner unsafe to workers, the general public, or the interconnected system or contrary to Environmental Laws or permits or without regard to defined limitations such as flood conditions, safety inspection requirements, operating voltage current, volt ampere reactive (VAr) loading, frequency, rotational speed, polarity synchronization and/or control system limits.

"Governmental Approval" means any valid waiver, exemption, variance, franchise, permit, authorization, license or similar order of or from, or filing or registration with, or notice to, any Governmental Authority having jurisdiction over the matter in question.

"Governmental Authority" means any federal, state, regional, local or municipal governmental body; any governmental, quasi-governmental, regulatory or administrative agency, commission, body or other authority exercising or entitled to exercise any administrative, executive, judicial, legislative, policy, regulatory or taxing authority or power; or any court or governmental tribunal; or any independent system operator, regional transmission authority or other similar entity.

"Hazardous Materials" means any substance, material, gas, or particulate matter that is regulated or for which liability is imposed pursuant to an Environmental Law by any Governmental Authority as an environmental pollutant or dangerous to public health, public welfare, or the natural environment including protection of non-human forms of life, natural resources, land, water, groundwater, and air, including any material or substance that is (i) defined as "toxic," "polluting," "hazardous waste," "hazardous material," "hazardous substance," "extremely hazardous waste," "solid waste" or "restricted hazardous waste" under any provision of local, state, or federal Law; (ii) petroleum, including any fraction, derivative or additive; (iii) asbestos; (iv) polychlorinated biphenyls; (v) radioactive material; (vi) designated as a "hazardous substance" pursuant to the Clean Water Act, 33 U.S.C. §1251 et seq. (33 U.S.C. §1251); (vii) defined as a "hazardous waste" pursuant to the Resource Conservation and Recovery Act, 42 U.S.C. §6901 et seq. (42 U.S.C. §6901); (viii) defined as a "hazardous substance" pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §9601 et seq. (42 U.S.C. §9601); (ix) defined as a "chemical substance"

under the Toxic Substances Control Act, 15 U.S.C. §2601 et seq. (15 U.S.C. §2601); or (x) defined as a pesticide under the Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. §136 et seq. (7 U.S.C. §136).

"Indemnified Party" shall have the meaning provided in Section 14.01(a).

"Indemnifying Party" shall have the meaning provided in Section 14.01(a).

"Interconnection Application" shall mean the Westar Interconnection Application to be completed by City which shall include a one-line diagram and load flow data sheet.

"ITC" means the investment tax credit arising under 26 U.S.C. §48(a)(3).

"ITC Grant" means a grant pursuant to Section 1603 of the American Recovery and Reinvestment Act of 2009 (ARRA) or any subsequent federal legislation which modifies the ARRA Section 1603 provisions.

"KCC" means the Kansas Corporation Commission or any successor agency.

"Law" means, with respect to any Governmental Authority, any constitutional provision, law, statute, rule, regulation, ordinance, treaty, order, decree, judgment, decision, common law, holding, injunction, Governmental Approval or requirement of such Governmental Authority. Unless the context clearly requires otherwise, the term "Law" shall include each of the foregoing (and each provision thereof) as in effect at the time in question, including any amendments, supplements, replacements, or other modifications thereto or thereof, and whether or not in effect as of the date of this Agreement.

"Location" shall have the meaning provided in the third paragraph of page one and as identified in Exhibit B.

"NERC" means the North American Electric Reliability Corporation or any successor organization.

"Operating Committee" means one representative each from Westar and City pursuant to Section 9.02.

"Operating Procedures" shall have the meaning provided in Section 4.04(f).

"Operating Records" means all operating logs, blueprints for construction, operating manuals, all warranties on equipment, and all documents, whether in printed or electronic format, that the City uses or maintains for the operation of the Facility.

"Party Representative" and "Parties' Representatives" shall have the meaning provided in Section 11.07(a).

"Person" means an individual, corporation, limited liability company, voluntary association, joint stock company, business trust, partnership, agency, Governmental Authority or other entity.

“Point of Delivery” means the electric system point at which City makes available to Westar the Renewable Energy being provided by City to Westar under this Agreement. The Point of Delivery is specified in Exhibit B.

“PTCs” means production tax credits arising under 26 U.S.C. § 45.

“Renewable Energy” means the net electric energy generated exclusively by the Facility (which is electric energy derived from a technology that exclusively relies on a renewable energy source) including any and all associated Environmental and Renewable Energy Credits and delivered to the Point of Delivery as measured by the Electric Metering Devices installed pursuant to Section 5.02.

“Renewable Energy Payment Credit” means the payment credit amount as described in Section 8.01.

“Renewable Energy Payment Rate” means the rate as defined in Article 7.

“Scheduled Outage/Derating” means a planned interruption/reduction of the Facility’s generation that both (i) has been coordinated in advance with Westar, with a mutually agreed start date and duration, and (ii) is required for inspection, or preventive or corrective maintenance.

“Settlement Amount” means, with respect to the non-defaulting Party, the Losses or Gains, and Costs, expressed in U.S. Dollars, which such Party incurs as a result of a termination of this Agreement in accordance with Section 10.04.

“Site” means the parcel of real property on which the Facility will be constructed and located, including any easements, rights of way, surface use agreements and other interests or rights in real estate reasonably necessary for the construction, operation and maintenance of the Facility. The Site is more specifically described in Section 3.02 and Exhibit B.

“SPP” means the Southwest Power Pool, Inc., or its successor as to any function.

“Term” means the period of time during which this Agreement shall remain in full force and effect, and which is further defined in Section 2.01.

“Termination Payment” shall have the meaning provided in Section 10.04.

“Test Energy” shall mean all Renewable Energy produced prior to the Commercial Operation Date pursuant to Section 4.05.

“Wind Turbines” means those generating devices powered by the wind that are included in the Facility.

ARTICLE 2

Term

Section 2.01 General. This Agreement shall become effective as of the Effective Date, and shall remain in full force and effect for twenty (20) years from the COD of the Facility (the "Term"), subject to any early termination or extension provisions set forth herein. Applicable provisions of this Agreement shall continue in effect after termination, including early termination, to the extent necessary to enforce or complete the duties, obligations or responsibilities of the Parties arising prior to termination and, as applicable, to provide for: final billings and adjustments related to the period prior to termination, repayment of any money due and owing to either Party pursuant to this Agreement, repayment of principal and interest associated with security funds, and the indemnifications specified in this Agreement.

Section 2.02 Evergreen Extension. This Agreement will continue for additional one (1) year terms after the expiration of the initial Term unless and until either Party provides the other Party with prior written notice at least sixty (60) days prior to the expiration of the initial Term or any subsequent one year term thereafter that such Party wishes to terminate this Agreement. The Renewable Energy Payment Rate, and the other terms and conditions, shall continue during any such extension terms.

ARTICLE 3

Facility Description

Section 3.01 Summary Description. City shall develop, construct, own, operate, and maintain the Facility, which shall consist of one (1), Nordic N1000, 1 MW Wind Turbines and associated equipment having a designed maximum output of approximately 1 MW. Exhibit B provides a preliminary description of the Facility, including identification of the equipment and components which make up the Facility.

Section 3.02 Location. The Facility shall be located on the Site and shall be identified as City's Renewable Generation Facility. A scaled map that identifies the Site, the expected location of the Facility at the Site, and the expected location of the Point of Delivery is included in Exhibit B.

Section 3.03 General Design of the Facility. City shall construct the Facility according to all national, state and local codes, Good Utility Practice(s) and Westar interconnection specifications.

Section 3.04 Finalization of Exhibit B. Exhibit B attached hereto represents a preliminary description of the Facility, the Site and the location of the Facility and Point of Delivery. City will provide Westar with a final version of Exhibit B prior to the commencement

of construction of the Facility, and such final version of Exhibit B shall be attached to this Agreement in lieu of the preliminary exhibit attached hereto.

ARTICLE 4

Commercial Operation

Section 4.01 Commercial Operation. Subject to extension as specifically provided for herein, the Facility shall achieve the Commercial Operation Date, and shall be fully capable of producing the Renewable Energy to be provided under this Agreement and delivering such Renewable Energy to Westar at the Point of Delivery, no later than the Commercial Operation Milestone; provided that City shall not be obligated to establish a Commercial Operation Date under this Agreement that is earlier than the Commercial Operation Milestone.

Section 4.02 Construction Milestones. The Parties agree time is of the essence in regards to the transactions contemplated by this Agreement. As such, and in order to achieve the Commercial Operation Date by the Commercial Operation Milestone, City agrees that the Construction Milestones set forth in Exhibit A must be achieved in a timely fashion.

Section 4.03 Westar's Rights During Construction. Westar shall have the right to monitor the construction, start-up and testing of the Facility, and City shall comply with all reasonable requests of Westar with respect to the monitoring of these events. City shall cooperate in such physical inspections of the Facility as may be reasonably requested by Westar during and after completion of construction. All persons visiting the Facility on behalf of Westar shall comply with all of City's applicable safety and health rules and requirements that are provided or identified to such persons, and shall not interfere with or disrupt the construction, operation or maintenance of the Facility. Westar's technical review and inspection of the Facility shall not be construed as endorsing the design thereof nor as any warranty of safety, durability, or reliability of the Facility.

Section 4.04 Conditions to Commercial Operation. City will notify Westar when the Facility has achieved the Commercial Operation Date, and, if Westar agrees, Westar will provide a written acknowledgment of its concurrence within twenty (20) Business Days that the Commercial Operation Date has been achieved and will be deemed to have been granted if Westar has not responded to City's notice, with reasons for any disagreement with City's notice, by the end of such twenty (20) Business Day period. Westar's acknowledgment is contingent upon City certifying and providing evidence reasonably acceptable to Westar of the satisfaction or occurrence of all of the conditions set forth in this Section 4.04 (the "Conditions"). The Parties agree that review and approval of such Conditions may occur on an ongoing and incremental basis, pending resolution of any dispute, as such Conditions are satisfied. The Conditions are:

(a) City has successfully completed that testing of the Facility for the commencement of commercial operation at the Facility;

(b) City has provided a list of the Facility's equipment, showing the make, model, serial number and designed maximum output (nameplate capacity) of each Wind Turbine and has certified the designed maximum output of each Wind Turbine of the entire Facility.

(c) the Facility has achieved initial synchronization with the Point of Delivery;

(d) all arrangements for the supply of required electric services to the Facility, including the supply of Wind Turbine unit start-up and shutdown power and energy, house power and maintenance power have been completed by City separate from this Agreement, are in effect, and are available for the supply of such electric services to the Facility;

(e) City has submitted to Westar a certificate of an officer of City familiar with the Facility after due inquiry stating that all Governmental Approvals required to be obtained by City from any Governmental Authority to construct and/or operate the Facility in compliance with applicable Law and this Agreement have been obtained and are in full force and effect, and that City is in compliance with the terms and conditions of this Agreement in all material respects;

(f) the Operating Committee has mutually agreed on written operating procedures (the "Operating Procedures") to be completed by the milestone in Exhibit A and shall include, but not be limited to, method for communicating Emergency Conditions, curtailments lasting more than 48 consecutive hours; metering, telemetering, Scheduled Outages, key personnel list for applicable Westar and City operating centers; Renewable Energy reports, and such other matters as may be mutually agreed upon by the Parties; and

(g) City has provided to Westar a completed Interconnection Application which has been approved by Westar.

Section 4.05 Test Energy. City shall notify Westar at least four (4) business days prior to the initial energizing and start-up testing of the Facility, and Westar shall have the right to have a representative present at such testing. Westar shall cooperate with City to facilitate City's testing of the Facility necessary to satisfy the Conditions set forth in Section 4.04, and, provided that adequate interconnection services and facilities and real-time metering equipment for the energy are available to the Facility as determined in the reasonable judgment of Westar, Westar shall accept delivery of all Test Energy produced by the Facility.

ARTICLE 5

Delivery and Metering

Section 5.01 Delivery Arrangements. City shall be responsible for all interconnection, electric losses and ancillary service arrangements and costs required to deliver the Renewable Energy and Test Energy from the Facility to Westar at the Point of Delivery. Westar shall be responsible for all electric losses, transmission and ancillary service

arrangements and costs required to receive the Renewable Energy and Test Energy at the Point of Delivery and deliver the Renewable Energy and Test Energy to points beyond the Point of Delivery.

Section 5.02 Electric Metering Devices.

(a) All Electric Metering Devices used to measure the Renewable Energy under this Agreement and to monitor and coordinate operation of the Facility shall be owned, installed, and maintained by Westar, and City shall reimburse Westar for all costs of installation of primary metering and related metering costs upon receipt of invoice costs from Westar. All Electric Metering Devices used to provide data for the computation of payments shall be sealed and only Westar may break the seal when such Electric Metering Devices are to be inspected and tested or adjusted in accordance with this Article 5. Westar shall specify the number, type, and location of such Electric Metering Devices, and City shall supply, at no cost to Westar, a suitable location for such Electric Metering Devices. All payment calculations will be based on interval supply information collected by Westar meters.

(b) City may elect to install and maintain, at its own expense, backup metering devices ("City's Back-Up Metering") in addition to those installed and maintained by Westar, which installation and maintenance shall be performed in a manner acceptable to Westar. City, at its own expense, shall inspect and test City's Back-Up Metering upon installation and at least annually thereafter. City shall provide Westar with reasonable advance notice of, and permit a representative of Westar to witness and verify, such inspections and tests; provided, however, that Westar shall not unreasonably interfere with or disrupt the activities of City and shall comply with all of City's safety standards. If requested by Westar in writing, City shall provide copies of any inspection or testing reports to Westar.

ARTICLE 6

Sale and Purchase of Renewable Energy

Section 6.01 Sale and Purchase. In accordance with and subject to the terms and conditions of this Agreement, beginning on the Commercial Operation Date, City shall generate from the Facility, deliver to the Point of Delivery, and sell to Westar, and Westar shall purchase from City, at the applicable price set forth in Article 7, all Renewable Energy generated by the Facility not otherwise consumed at the Location which is delivered to the Point of Delivery and such price shall also include all associated Environmental and Renewable Energy Credits for the energy delivered to the Point of Delivery.

Section 6.02 Committed Renewable Energy. Committed Renewable Energy shall equal all Renewable Energy not otherwise consumed at the Location, which is delivered to the Point of Delivery as measured by Westar's meter through the Term of this Agreement.

Section 6.03 Title and Risk of Loss. As between the Parties, City shall be deemed to be in control of the Renewable Energy and Test Energy output from the Facility up to the Point of Delivery, and Westar shall be deemed to be in control of such energy from and after the Point of Delivery. Title and risk of loss related to the Renewable Energy and Test Energy shall transfer from City to Westar at the Point of Delivery.

Section 6.04 Westar's Right to Curtail Renewable Energy. Westar shall have the right to notify City, by telephonic or electronic communication, to curtail the delivery of Renewable Energy to Westar from the Facility due to any Emergency, notice to curtail pursuant to the SPP (or its successor as the "Regional Entity" authorized by NERC (and FERC) to enforce NERC-approved reliability standards, or a Force Majeure event, or other declared system condition requiring curtailment, and City shall immediately comply with such notification. For avoidance of doubt, Westar shall not be responsible for any payments to City due to any shut down or curtailment of the Facility pursuant to this Section 6.04.

ARTICLE 7

Renewable Energy Payment Rate

Section 7.01 Payment. During the Term of this Agreement and accept as otherwise provided below, Westar shall pay City for Test Energy and Renewable Energy delivered to Westar by City to the Point of Delivery at an energy payment rate equal to **2.9 cents per kWh** (the "Renewable Energy Payment Rate") which payment will include the right and title to all associated Environmental and Renewable Energy Credits produced by the generation of Renewable Energy at the Facility which is delivered to the Point of Delivery. For the avoidance of doubt, Westar shall not be obligated to make any payment to City under this Article 7 for any energy which, regardless of reason or event of Force Majeure affecting either Party, (i) does not qualify as Renewable Energy, (ii) is not measured by the installed Electric Metering Device(s), or (iii) is not delivered to Westar at the Point of Delivery. Notwithstanding the foregoing, City may provide Westar with written notice not more than 180 days but not less than 60 days prior to the expiration of year ten (10) of the Term of the Agreement that the City would like to discuss a possible renegotiation of the Renewable Energy Payment Rate with Westar; provided, however, neither party shall be contractually required or obligated to amend the Renewable Energy Payment Amount or to reach an alternative renewable energy payment rate regardless of renewable wind energy market conditions or other renewable energy transactions entered into by either Party. Upon Westar's receipt of written notice of City's request to discuss a possible negotiation of the Renewable Energy Payment Rate, Westar will contact City within 10 Business Days to set up a meeting to begin such alternative rate discussions. In the event the Parties cannot mutually agree on a revised Renewable Energy Payment Rate before the beginning of year eleven (11) of the Agreement Term, the current Renewable Energy Payment Rate will continue to apply for the remainder of the Agreement Term.

ARTICLE 8

Billing and Payment

Section 8.01 Billing Invoices. The monthly billing period shall be the calendar month. All metered Renewable Energy delivered to the Point of Delivery will be metered by the hour and reflected in the next month's retail electric invoice that the City receives from Westar as a separate line item and the dollar amount that Westar owes City for that applicable billing month for Renewable Energy delivered to the Point of Delivery (the "Renewable Energy Payment Credit") will appear as a credit on that next month's retail monthly electric bill that City receives from Westar.

Section 8.02 Payments.

(a) If the City's monthly retail electric billing amount on the monthly invoice that City receives from Westar exceeds the applicable monthly Renewable Energy Payment Credit amount also notated in such monthly retail electric billing invoice, City shall be deemed to have received the monthly payment amount owed by Westar to City under this Agreement and City shall be required to pay Westar only the retail monthly electric bill amount remaining after deduction of the Renewable Energy Payment Credit amount. This payment deduction and total payment amount owed calculation will be reflected on City's monthly retail electric bill that City receives from Westar.

(b) In the event that the applicable monthly Renewable Energy Payment Credit exceeds City's retail monthly electric billing amount on the monthly invoice that City receives from Westar, the invoice will reflect that City owes no payment to Westar for that applicable billing month and Westar shall make payment to City within thirty (30) days of City's receipt of the monthly retail electric billing invoice showing such Renewable Energy Payment Credit amount still owed by Westar to City.

ARTICLE 9

Operations and Maintenance

Section 9.01 Outage and Performance Reporting. When Forced Outages occur, City shall notify Westar's Operating Committee representative of the existence, nature, and expected duration of the Forced Outage as soon as practicable. Thereafter, City shall promptly inform Westar's Operating Committee representative of changes in the expected duration of the Forced Outage unless relieved of this obligation by Westar's Operating Committee representative.

Section 9.02 Operating Committee. Westar and City shall each appoint one representative and one alternate representative to act in matters relating to the Parties' performance obligations under this Agreement and to develop operating arrangements for the

generation, delivery and receipt of Renewable Energy hereunder. Such representatives shall constitute the Operating Committee, and the initial representatives are specified on Exhibit C. The Parties shall notify each other in writing of such appointments and any changes thereto. The Operating Committee shall have no authority to modify the terms or conditions of this Agreement.

Section 9.03 Reliability Standards. City shall operate the Facility in a manner that complies with all applicable reliability standards, including any applicable standards set by SPP, NERC, the FERC, the KCC, or any successor agencies setting reliability standards for the operation of generation facilities. To the extent that City or the Facility contributes in whole or in part to actions that result in monetary penalties being assessed to Westar by SPP, NERC, or any successor agency, for lack of compliance with reliability standards or curtailment requests by Westar due to an Emergency, City shall reimburse Westar for its share of such monetary penalties.

Section 9.04 Environmental Credits. The Parties acknowledge that future legislation or regulation may create value in the ownership, use or allocation of Environmental and Renewable Energy Credits. To the full extent allowed by such Law, Westar shall own or be entitled to claim all Environmental and Renewable Energy Credits to the extent such credits may exist during the Term which specifically relate to and are specifically limited to Environmental and Renewable Energy Credits associated with Renewable Energy produced by the Facility and delivered to the Point of Delivery, and, to the extent necessary or as requested by Westar, City shall assign to Westar all rights and authority for Westar to register, hold and manage such specific credits in Westar's own name and to such account, including any rights associated with any renewable energy information or tracking system that may be established with regard to monitoring, tracking certifying, or trading such credits. For the avoidance of doubt, Westar agrees and acknowledges that City will retain all rights, title and interest to all Environmental and Renewable Energy Credits associated with Renewable Energy produced at the Facility which is consumed by City at the Facility Location.

ARTICLE 10

Default and Remedies

Section 10.01 Events of Default of City.

(a) Any of the following shall constitute an Event of Default of City upon its occurrence and no cure period shall be applicable:

(i) the sale by City to a third party, or diversion by City for any use, of Renewable Energy committed to Westar by City; or

(ii) City's actual (as opposed to constructive) fraud, tampering with Westar owned facilities or material intentional misrepresentation or willful misconduct in connection with this Agreement and/or the operation of the Facility;

(b) Westar may declare an Event of Default for City's (or City Guarantor's) failure to make, when due, any payment required under this Agreement if such failure is not remedied within twenty (20) Business Days after the date of written notice from Westar to City.

(c) Any of the following shall constitute an Event of Default of City upon its occurrence but shall be subject to cure within thirty (30) Days after written notice from Westar to City:

(i) except as otherwise expressly provided in this Section 10.01, City's failure to comply with any other material obligation under this Agreement which would result in a material adverse impact on Westar; provided, however, that if such failure is not reasonably susceptible of cure within the thirty (30) Day period specified above, City shall be granted such additional time, not to exceed an additional sixty (60) Days, to cure such failure;

(ii) City's assignment of this Agreement, or any Change of Control, or City's sale or transfer of its interest, or any part thereof, in the Facility, except as permitted in accordance with Article 16; or

(iii) any representation or warranty made by City in this Agreement shall prove to have been false or misleading in any material respect when made or ceases to remain true during the Term if such cessation has resulted or would reasonably be expected to result in a material adverse impact on Westar.

Section 10.02 Events of Default of Westar.

(a) Any of the following shall constitute an Event of Default of Westar upon its occurrence and no cure period shall be applicable:

(i) Westar's dissolution or liquidation, provided that a division of Westar into multiple Persons shall not constitute dissolution or liquidation if all of such entity's obligations under this Agreement are assumed by an entity that holds a credit rating at least equal to that of Westar immediately before such division;

(ii) Westar's assignment of this Agreement or any of its rights hereunder for the benefit of creditors, other than as security for any financing being made available to Westar; and/or

(iii) Westar's voluntary filing of a petition in bankruptcy or insolvency or for reorganization or arrangement under the bankruptcy Laws of the United States or under any insolvency act of any State, or Westar's voluntarily taking advantage of any such Law or act by answer or otherwise.

(b) Westar's failure to make, when due, any payment required under this Agreement (net of outstanding damages and any other rights of offset that Westar may have pursuant to this Agreement) if such failure is not remedied within twenty (20) Business Days after the date of written notice from City to Westar.

(c) Any of the following shall constitute an Event of Default of Westar upon its occurrence but shall be subject to cure within thirty (30) Days after the date of occurrence:

(i) Westar's failure to comply with any other material obligation under this Agreement, which would result in a material adverse impact on City, if such failure continues for sixty (60) Days;

(ii) Westar's assignment of this Agreement, except as permitted in accordance with Article 16; and/or

(iii) any representation or warranty made by Westar in this Agreement shall prove to have been false or misleading in any material respect when made.

(d) The filing of a case in bankruptcy or any proceeding under any other insolvency Law against Westar as debtor that could materially impact Westar's ability to perform its obligations hereunder shall constitute an Event of Default of Westar unless Westar obtains a stay or dismissal of the filing within sixty (60) Days after such filing was made.

Section 10.03 Damages Prior to Termination. Upon the occurrence of an Event of Default, the non-defaulting Party shall have the right to collect damages accruing prior to the termination of this Agreement from the defaulting Party as set forth herein, and the payment of any such damages accruing prior to the cure of an Event of Default shall constitute a part of the cure.

Actual Damages - For all Events of Default the non-defaulting Party shall be entitled to receive from the defaulting Party all of the actual, direct damages incurred by the non-defaulting Party in connection with such Event of Default; provided that if an Event of Default has occurred and has continued uncured for a period of three hundred sixty-five (365) Days, the non-defaulting Party shall be required to either waive its right to collect further damages on account of such Event of Default or elect to terminate this Agreement as provided for in Section 10.04.

Section 10.04 Termination. Upon the occurrence and during the continuation of an Event of Default which has not been cured within the applicable cure period, the non-defaulting Party shall have the right to declare a date (the "Early Termination Date"), which shall be between fifteen (15) and thirty (30) Days after the notice thereof, upon which this Agreement shall terminate. Neither Party shall have the right to terminate this Agreement except as described above or as otherwise may be explicitly provided for in this Agreement.

(i) The non-defaulting Party shall calculate (and provide detailed calculations to the defaulting Party), in a commercially reasonable manner, the Settlement Amount as of the Early Termination Date. The non-defaulting Party shall aggregate all Settlement Amounts into a single amount by netting out (a) all Settlement Amounts that are due to the defaulting Party, plus any or all other amounts due to the defaulting Party under this Agreement against (b) all Settlement Amounts that are due to the non-defaulting Party, plus any or all other amounts due to the non-defaulting Party under this Agreement, so that all such amounts shall be netted out into a single liquidated

amount (the "Termination Payment"). The defaulting Party shall be liable to the non-defaulting Party to the extent that the Settlement Amount due to the non-defaulting Party exceeds the Settlement Amount due to the defaulting Party. In no event shall the non-defaulting Party be obligated to make a Termination Payment to the defaulting Party.

(ii) As soon as practicable after the Early Termination Date, the non-defaulting Party shall give notice to the defaulting Party of the amount of the Termination Payment due from the defaulting Party, if any. The notice shall include a written statement explaining in reasonable detail the calculation of such amount. If a Termination Payment is owed by the defaulting Party, such Termination Payment shall be made by the defaulting Party within ten (10) Business Days after such notice is effective.

(iii) If the defaulting Party disputes the non-defaulting Party's calculation of the Termination Payment, in whole or in part, the defaulting Party shall, within ten (10) Business Days of receipt of the non-defaulting Party's calculation of the Termination Payment, deliver a Dispute Notice; provided, however, that if the Termination Payment is due from the defaulting Party, the defaulting Party shall first post collateral in the form of either cash, letters of credit or other security reasonably acceptable to the non-defaulting Party in an amount equal to the Termination Payment.

Section 10.05 Remedies Cumulative. Each right or remedy of the Parties provided for in this Agreement shall be cumulative of and shall be in addition to every other right or remedy provided for in this Agreement, and the exercise, or the beginning of the exercise, by a Party of any one or more of the rights or remedies provided for herein shall not preclude the simultaneous or later exercise by such Party of any or all other rights or remedies provided for herein.

Section 10.06 Other Remedies. The termination of this Agreement shall not relieve either Party of any unfulfilled obligation or undischarged liability of such Party on or before the Early Termination Date, including any damages incurred by either Party as a result of any breach of or Event of Default under this Agreement prior to the Early Termination Date; provided that the Termination Payment determined as set forth in Section 10.04 shall be the Parties' sole and exclusive remedy under this Agreement for termination. Upon or at any time after the occurrence and during the continuation of an Event of Default or an Early Termination Date affecting a defaulting Party, the non-defaulting Party may exercise any of the rights and remedies available to it, including any ancillary rights and remedies under applicable Law then in effect.

Section 10.07 Duty to Mitigate. Each Party agrees that it has a duty to mitigate damages and covenants that it will use commercially reasonable efforts to minimize any damages it may incur as a result of the other Party's performance or non-performance of this Agreement.

Section 10.08 Limitation of Liability.

(a) EXCEPT AS SET FORTH HEREIN, THERE ARE NO WARRANTIES BY EITHER PARTY UNDER THIS AGREEMENT, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND ANY AND ALL IMPLIED WARRANTIES ARE DISCLAIMED. THE PARTIES CONFIRM THAT THE EXPRESS REMEDIES AND MEASURES OF DAMAGES PROVIDED IN THIS AGREEMENT SATISFY THE ESSENTIAL PURPOSES HEREOF.

(b) UNLESS EXPRESSLY PROVIDED IN THIS AGREEMENT, NEITHER PARTY SHALL BE LIABLE FOR CONSEQUENTIAL, INCIDENTAL, PUNITIVE, EXEMPLARY OR INDIRECT DAMAGES, LOST PROFITS OR OTHER BUSINESS INTERRUPTION DAMAGES, BY STATUTE, IN TORT OR CONTRACT, UNDER ANY INDEMNITY PROVISION OR OTHERWISE.

(c) TO THE EXTENT ANY DAMAGES REQUIRED TO BE PAID HEREUNDER ARE LIQUIDATED, THE PARTIES ACKNOWLEDGE THAT THE DAMAGES ARE DIFFICULT OR IMPOSSIBLE TO DETERMINE, OR OTHERWISE OBTAINING AN ADEQUATE REMEDY IS INCONVENIENT AND THE DAMAGES CALCULATED HEREUNDER CONSTITUTE A REASONABLE APPROXIMATION OF, AND THE EXCLUSIVE REMEDY FOR, THE HARM OR LOSS.

(d) NOTHING IN THIS SECTION PREVENTS, OR IS INTENDED TO PREVENT WESTAR FROM PROCEEDING AGAINST OR EXERCISING ITS RIGHTS WITH RESPECT TO ANY SECURED INTERESTS IN COLLATERAL AND/OR TERMINATING THIS AGREEMENT.

ARTICLE 11

Contract Administration and Notices

Section 11.01 Notices in Writing. Notices required by this Agreement shall be addressed to the other Party, including the other Party's representative on the Operating Committee, at the addresses noted in Exhibit C as either Party updates them from time to time by written notice to the other Party. Any notice, request, consent, or other communication required or authorized under this Agreement to be given by one Party to the other Party shall be in writing. It shall either be hand delivered or mailed, postage prepaid, to the representative of said other Party. If mailed, the notice, request, consent or other communication shall be simultaneously sent by facsimile or other electronic means. Any such notice, request, consent, or other communication shall be deemed to have been received by the Close of the Business Day on which it was hand delivered or transmitted electronically (unless hand delivered or transmitted after such close in which case it shall be deemed received at the close of the next Business Day). Real-time or routine communications concerning Facility operations shall be exempt from this Section 11.01.

Section 11.02 Representative for Notices. Each Party shall maintain a designated representative to receive notices. Such representative may, at the option of each Party, be the same person as that Party's representative or alternate representative on the Operating Committee, or a different person. Either Party may, by written notice to the other Party, change the representative or the address to which such notices and communications are to be sent.

Section 11.03 Authority of Representatives. The Parties' representatives designated above shall have authority to act for its respective principals in all technical matters relating to performance of this Agreement and to attempt to resolve disputes or potential disputes. However, they, in their capacity as representatives, shall not have the authority to amend, modify or waive any provision of this Agreement.

Section 11.04 Operating Records. City and Westar shall each keep complete and accurate records and all other data required by each of them for the purposes of proper administration of this Agreement, including such records as may be required by local, state or federal regulatory authorities in the prescribed format.

Section 11.05 Billing and Payment Records. To facilitate Renewable Energy Payment Credit amount and proper payment verification, City and Westar shall keep all books and records necessary for billing and payments and grant the other Party reasonable access to those records.

Section 11.06 Examination of Records. City and Westar may examine the Operating Records and data kept by the other Party relating to transactions under and administration of this Agreement, at any time during the period the records are required to be maintained, upon reasonable advance notice and during normal business hours.

Section 11.07 Dispute Resolution.

(a) In the event of any dispute arising under this Agreement (a "Dispute"), within ten (10) Days following the delivered date of a written request by either Party (a "Dispute Notice"), (i) each Party shall appoint a representative (individually, a "Party Representative", together, the "Parties' Representatives"), and (ii) the Parties' Representatives shall meet, negotiate and attempt in good faith to resolve the Dispute quickly, informally and inexpensively. In the event the Parties' Representatives cannot resolve the Dispute within thirty (30) Days after commencement of negotiations, within ten (10) Days following any request by either Party at any time thereafter, each Party Representative: (A) shall independently prepare a written summary of the Dispute describing the issues and claims, (B) shall exchange its summary with the summary of the Dispute prepared by the other Party Representative, and (C) shall submit a copy of both summaries to a senior officer of the Party Representative's Party with authority to irrevocably bind the Party to a resolution of the Dispute. Within ten (10) Business Days after receipt of the Dispute summaries, the senior officers for both Parties shall negotiate in good faith to resolve the Dispute.

(b) If the Parties are unable to resolve the Dispute in accordance with Section 11.07(a) within fourteen (14) Days following receipt of the Dispute summaries by the senior officers, the Parties may seek any and all legal remedies available to them.

(c) Notwithstanding any provision in this Agreement to the contrary, if no Dispute Notice has been issued within twenty-four (24) months following the occurrence of all events and the existence of all circumstances giving rise to the Dispute (regardless of the knowledge or potential knowledge of either Party of such events and circumstances), the Dispute and all claims related thereto shall be deemed waived and the aggrieved Party shall thereafter be barred from proceeding thereon.

ARTICLE 12

Force Majeure and Delay Conditions

Section 12.01 Definition of Force Majeure. The term "Force Majeure", as used in this Agreement, means causes or events beyond the reasonable control of, and without the fault or negligence of the Party claiming Force Majeure, including acts of God, sudden actions of the elements such as floods, earthquakes, hurricanes, tornadoes; lightning; fire; ice storms; sabotage; vandalism beyond that which could reasonably be prevented by City; terrorism; war; riots; fire; explosion; blockades; insurrection; local strike at the site of the turbine supplier or strike at a national or regional level otherwise; slow downs or labor disruptions at a national or regional level (even if such difficulties could be resolved by conceding to the demands of a labor group). The term Force Majeure does not include (i) any acts or omissions of any third party, including any Governmental Authority, vendor, materialman, customer, or supplier of the Party claiming Force Majeure, when such third party is acting in its capacity as a contractor or customer of the Party claiming Force Majeure unless such acts or omissions are themselves excused by reason of Force Majeure; (ii) any full or partial curtailment in the electric output of the Facility that is caused by or arises from a mechanical or equipment breakdown or other mishap or events or conditions attributable to normal wear and tear or flaws, unless such mishap is caused by one of the following: catastrophic equipment failure; acts of God; sudden actions of the elements, including floods, hurricanes, or tornadoes; sabotage; terrorism; war; riots; and emergency orders issued by a Governmental Authority, (iii) inability to obtain labor, equipment or parts unless the unavailability of such labor, equipment or parts is itself due to a Force Majeure; or (iv) curtailment or unavailability of transmission service on the claiming Party's side of the Point of Delivery.

Section 12.02 Applicability of Force Majeure.

(a) Neither Party shall be responsible or liable for any delay or failure in its performance under this Agreement, nor shall any delay, failure, or other occurrence or event become an Event of Default, to the extent such delay, failure, occurrence or event is substantially caused by conditions or events of Force Majeure, provided that:

(i) the non-performing Party gives the other Party prompt written notice (but in any event longer than ten (10) days after the commencement of the effect of the Force Majeure event) describing the particulars of the occurrence of the Force Majeure;

(ii) the suspension of performance is of no greater scope and of no longer duration than is required by the Force Majeure;

(iii) the non-performing Party proceeds with reasonable diligence to remedy its inability to perform and provides weekly progress reports to the other Party describing actions taken to end the Force Majeure; and

(iv) when the non-performing Party is able to resume performance of its obligations under this Agreement, such Party shall give the other Party written notice to that effect.

(b) Except as otherwise expressly provided for in this Agreement, the existence of a condition or event of Force Majeure shall not relieve the Parties of their obligations under this Agreement (including payment obligations) to the extent that performance of such obligations is not precluded by the condition or event of Force Majeure.

Section 12.03 Limitations on Effect of Force Majeure.

In no event will any delay or failure of performance caused by any conditions or events of Force Majeure extend this Agreement beyond its stated Term. In the event that any delay or failure of performance of a material part of a Party's obligations hereunder caused by conditions or events of Force Majeure continues for an uninterrupted period of three hundred sixty-five (365) Days from its occurrence or inception, the Party not claiming Force Majeure may, at any time following the end of such three hundred sixty-five (365) Day period and during the continuation of the effect of the Force Majeure, terminate this Agreement upon written notice to the affected Party, without further obligation by either Party except as to costs and balances incurred prior to the effective date of such termination. The Party not claiming Force Majeure may, but shall not be obligated to, extend such three hundred sixty-five (365) Day period, for such additional time as it, at its sole discretion, deems appropriate, if the affected Party is exercising due diligence in its efforts to cure the conditions or events of Force Majeure.

Section 12.04 Change in Market Design. If a Change in Market Design renders this Agreement or any material terms herein incapable of being performed, then either Party, on written notice to the other Party, may request the other Party to enter into negotiations to make the minimum changes to this Agreement necessary to make this Agreement capable of being performed and administered, while attempting to preserve to the maximum extent possible the benefits, burdens and obligations set forth in this Agreement as of the Effective Date. Upon receipt of a written notice requesting negotiations, the Parties shall negotiate in good faith. If the Parties are unable, within sixty (60) Days after the sending of the written notice requesting negotiations, either to agree upon changes to this Agreement or to resolve issues relating to changes to this Agreement, then either Party may submit issues pertaining to changes for dispute resolution pursuant to Section 11.07. A change in cost shall not in itself be deemed to render this Agreement or any terms herein incapable of being performed or administered, or constitute, or form the basis of, a Force Majeure event.

ARTICLE 13

Representations, Warranties and Covenants

Section 13.01 City's Representations, Warranties and Covenants. City hereby represents and warrants as follows:

(a) The execution, delivery, and performance of its obligations under this Agreement by City have been duly authorized by all necessary company action, and do not and will not:

(i) violate any provision of Law in effect having applicability to City or violate any provision in any formation documents of City, the violation of which could have a material adverse effect on the ability of City to perform its obligations under this Agreement; or

(ii) result in a breach or constitute a default under City's organizational documents or under any agreement relating to the management or affairs of City or any indenture or loan or credit agreement, or any other agreement, lease, or instrument to which City is a party or by which City or its properties or assets may be bound or affected, the breach or default of which could reasonably be expected to have a material adverse effect on the ability of City to perform its obligations under this Agreement.

(b) This Agreement is a valid and binding obligation of City.

(c) To the best knowledge of City, all Governmental Approvals and board approvals required to authorize City's execution, delivery and performance of this Agreement have been duly obtained and are in full force and effect.

(d) City shall remain obligated to meet all obligations and requirements of Westar Energy, Inc.'s Generation Substitution Service filed with the KCC.

(e) City shall continue to comply with K.S.A. 66-1184(c)(2) and (3).

(f) City has and will maintain payment security with Westar which is consistent with existing KCC-approved Westar Energy General Terms and Conditions for Electric Service.

Section 13.02 Westar's Representations, Warranties and Covenants. Westar hereby represents and warrants as follows:

(a) Westar is a public utility duly organized, validly existing and in good standing under the Laws of the State of Kansas and is qualified in each other jurisdiction where the failure to so qualify would have a material adverse effect upon the business or financial condition of Westar; and both Westar has all requisite power and authority to conduct its business, to own its properties, and to execute, deliver, and perform its obligations under this Agreement.

(b) The execution, delivery, and performance of its obligations under this Agreement by Westar have been (after the Effective Date) duly authorized by all necessary corporate action, and do not and will not:

(i) violate any provision of Law in effect having applicability to Westar or violate any provision in any corporate documents of Westar, the violation of which could have a material adverse effect on the ability of Westar to perform its obligations under this Agreement; or

(ii) result in a breach or constitute a default under Westar's bylaws, or under any agreement relating to the management or affairs of Westar, or any indenture or loan or credit agreement, or any other agreement, lease, or instrument to which Westar is a party or by which Westar or its properties or assets may be bound or affected, the breach or default of which could reasonably be expected to have a material adverse effect on the ability of Westar to perform its obligations under this Agreement.

(c) To the best knowledge of Westar, all Governmental Approvals and internal approvals required to authorize Westar's execution, delivery and performance of this Agreement, have been duly obtained and are in full force and effect.

ARTICLE 14

Indemnity

Section 14.01 Indemnity.

(a) Each Party (the "Indemnifying Party") agrees to indemnify, defend and hold harmless the other Party (the "Indemnified Party") from and against all claims, demands, losses, liabilities, penalties, and expenses (including reasonable attorneys' fees) for personal injury or death to natural persons and physical damage to tangible property of any Person to the extent arising out of, resulting from, or caused by an Event of Default under this Agreement, violation of any applicable Environmental Laws, or by the negligent or tortious acts, errors or omissions of the Indemnifying Party, its Affiliates, its directors, officers, employees, or agents. Nothing in this Section 14.01 shall enlarge or relieve City or Westar of any liability to the other for any breach of this Agreement or for any event or occurrence for which any other remedy is specified hereunder. This indemnification obligation shall apply notwithstanding any negligent or intentional acts, errors or omissions of the Indemnified Party, but the Indemnifying Party's liability to pay damages to the Indemnified Party shall be reduced in proportion to the percentage by which the Indemnified Party's negligent or intentional acts, errors or omissions caused the damages. Neither Party shall be indemnified for its damages resulting from its sole negligence, intentional acts or willful misconduct. These indemnity provisions shall not be construed to relieve any insurer of its obligation to pay claims consistent with the provisions of a valid insurance policy.

(b) Promptly after receipt by a Party of any claim or notice of the commencement of any action, administrative, or legal proceeding, or investigation as to which the indemnity provided for in this Article 14 may apply, the Indemnified Party shall notify the Indemnifying Party in writing of such fact. The Indemnifying Party shall assume the defense thereof with counsel designated by such Party and satisfactory to the Indemnified Party, provided, however, that if the defendants in any such action include both the Indemnified Party and the Indemnifying Party and the Indemnified Party shall have reasonably concluded that there may be legal defenses available to it which are different from or additional to, or inconsistent with, those available to the Indemnifying Party, the Indemnified Party shall have the right to select and be represented by separate counsel, at the Indemnifying Party's expense, unless a liability insurer is willing to pay such costs.

(c) If the Indemnifying Party fails to assume the defense of a claim meriting indemnification, the Indemnified Party may at the expense of the Indemnifying Party contest, settle, or pay such claim, provided that settlement or full payment of any such claim may be made only following consent of the Indemnifying Party or, absent such consent, written opinion of the Indemnified Party's counsel that such claim is meritorious or warrants settlement.

(d) Except as otherwise provided in this Article 14, in the event that a Party is obligated to indemnify and hold the other Party and its successors and assigns harmless under this Article 14, the amount owing to the Indemnified Party will be the amount of the Indemnified Party's actual loss net of any insurance proceeds received by the Indemnified Party following a reasonable effort by the Indemnified Party to obtain such insurance proceeds.

ARTICLE 15

Legal and Regulatory Compliance

Section 15.01 Legal and Regulatory Compliance.

(a) Each Party shall at all times comply with all Laws applicable to it, except for any non-compliance which, individually or in the aggregate, could not reasonably be expected to have a material effect on the business or financial condition of the Party or its ability to fulfill its commitments hereunder. As applicable, each Party shall give all required notices, shall procure and maintain all necessary governmental permits, licenses, and inspections necessary for performance of this Agreement, and shall pay its respective charges and fees in connection therewith.

(b) Each Party shall deliver or cause to be delivered to the other Party certificates of its officers, accountants, engineers or agents as to matters as may be reasonably requested, and shall make available, upon reasonable request, personnel and records relating to the Facility, in each case to the extent that the requesting Party requires the same in order to fulfill any regulatory reporting requirements, or to assist the requesting Party in litigation, including administrative proceedings before utility regulatory commissions.

ARTICLE 16

Assignment and Other Transfer Restrictions

Section 16.01 Assignment. This Agreement shall inure to the benefit of and be binding upon the successors and assigns of the respective Parties. Subject to this Article 16, no assignment or transfer of this Agreement by a Party or such Party's rights or obligations hereunder shall be effective without the prior written approval of the other Party. However, either Party may transfer or assign its rights and obligations hereunder to an Affiliate or any Person succeeding to all or substantially all of the assets of the assigning Party to the Affiliate or Person with equal or greater creditworthiness as determined by the non-assigning Party using commercially reasonable credit standards without obtaining the prior written approval of the other Party; provided, further that Westar may assign this Agreement without the prior written consent of the City to a franchised public utility with equal or greater creditworthiness as determined by the City using commercially reasonable credit standards. No assignment of this Agreement by either Party shall relieve the assignor of any obligation, duty or liability hereunder except to the extent such Party is expressly released in writing from any such obligation, duty or liability by the other Party. Any purported assignment in contravention of this Article 16 shall be null and void.

ARTICLE 17

Miscellaneous

Section 17.01 Applicable Law; Jurisdiction. THIS AGREEMENT SHALL BE GOVERNED BY AND INTERPRETED IN ACCORDANCE WITH THE LAWS OF THE STATE OF KANSAS.

Section 17.02 Binding Effect. This Agreement, as it may be amended from time to time, shall be binding upon and inure to the benefit of the Parties hereto and their respective successors in interest, legal representatives, and assigns permitted hereunder.

Section 17.03 Complete Agreement; Amendments. The terms and provisions contained in this Agreement constitute the entire agreement between Westar and City with respect to the Facility and shall supersede all previous communications, representations, or agreements, either verbal or written, between Westar and City with respect to the sale of Renewable Energy and Environmental and Renewable Energy Credits from the Facility. This Agreement may be amended, changed, modified, or altered, provided that such amendment, change, modification, or alteration shall be in writing and signed by both Parties hereto. To the extent that this Agreement does not address certain terms, conditions or obligations, the Parties agree that they will rely upon the applicable terms and conditions as found within the Westar Energy, Inc. General Terms and Conditions for Electric Service filed with the KCC at that time.

Section 17.04 Counterparts. This Agreement may be executed in any number of counterparts, and each executed counterpart shall have the same force and effect as an original instrument.

Section 17.05 Disclaimer of Third Party Beneficiary Rights. In executing this Agreement, Westar does not, nor should it be construed to, extend its credit or financial support for the benefit of any third parties lending money to or having other transactions with City. Nothing in this Agreement shall be construed to create any duty to, or standard of care with reference to, or any liability to, any Person not a party to this Agreement.

Section 17.06 Fines and Penalties.

(a) A Party shall pay when due all fees, fines, penalties or costs incurred by such Party or its agents, employees or contractors for noncompliance by such Party, its employees, or subcontractors with any provision of this Agreement, or any contractual obligation, permit or requirements of Law except for such fines, penalties and costs that are being actively contested in good faith and with due diligence by such Party and for which adequate financial reserves have been set aside to pay such fines, penalties or costs in the event of an adverse determination.

(b) If fees, fines, penalties, or costs are claimed or assessed against a Party (the "First Party") by any Governmental Authority due to noncompliance by the other Party (the "Second Party") with this Agreement, any requirements of Law with which compliance is required by this Agreement, any permit or contractual obligation, or, if the work of the First Party or any of its contractors or subcontractors is delayed or stopped by order of any Governmental Authority due to the Second Party's noncompliance with any requirements of Law with which compliance is required by this Agreement, permit, or contractual obligation, the Second Party shall indemnify and hold the First Party harmless against any and all losses, liabilities, damages, and claims suffered or incurred by the First Party, including claims for indemnity or contribution made by third parties against the First Party, except to the extent the First Party recovers any such losses, liabilities or damages through other provisions of this Agreement.

Section 17.07 Headings. Captions and headings used in this Agreement are for ease of reference only and do not constitute a part of this Agreement.

Section 17.08 Rate Changes

(a) The terms and conditions and the rates for service specified in this Agreement shall remain in effect for the term of the transaction described herein. Absent the Parties' written agreement, this Agreement shall not be subject to change by application of either Party pursuant to Section 205 or 206 of the Federal Power Act.

(b) Absent the agreement of all Parties to the proposed change, the standard of review for changes to any section of this Agreement specifying the rate(s) or other material economic terms and conditions agreed to by the Parties herein, whether proposed by a Party, a non-party or FERC acting sua sponte, shall be the "public interest" standard of review set forth in United Gas Pipe Line Co. v. Mobile Gas Service Corp., 350 U.S. 332 (1956) and Federal

Power Commission v. Sierra Pacific Power Co., 350 U.S. 348 (1956)(the "Mobile-Sierra" doctrine).

Section 17.09 Relationship of the Parties.

(a) This Agreement shall not be interpreted to create an association, joint venture, or partnership between the Parties nor to impose any partnership obligation or liability upon either Party. Neither Party shall have any right, power, or authority to enter into any agreement or undertaking for, or act on behalf of, or to act as an agent or representative of, the other Party.

(b) City shall be solely liable for the payment of all wages, taxes, and other costs related to the employment of persons to perform such services, including all federal, state, and local income, social security, payroll, and employment taxes and statutorily mandated workers' compensation coverage. None of the persons employed by City shall be considered employees of Westar for any purpose; nor shall City represent to any person that he or she is or shall become a Westar employee.

Section 17.10 Severability. In the event any of the terms, covenants, or conditions of this Agreement, its Exhibits, or the application of any such terms, covenants, or conditions, shall be held invalid, illegal, or unenforceable by any court or administrative body having jurisdiction, all other terms, covenants, and conditions of this Agreement and their application not adversely affected thereby shall remain in force and effect; provided, however, that Westar and City shall negotiate in good faith to attempt to implement an equitable adjustment in the provisions of this Agreement with a view toward effecting the purposes of this Agreement by replacing the provision that is held invalid, illegal, or unenforceable with a valid provision the economic effect of which comes as close as possible to that of the provision that has been found to be invalid, illegal or unenforceable.

Section 17.11 Survival of Obligations. Cancellation, expiration, or earlier termination of this Agreement shall not relieve the Parties of obligations that by their nature should survive such cancellation, expiration, or termination, prior to the term of the applicable Statute of Limitations, including warranties, remedies, or indemnities which obligation shall survive for the period of the applicable statute(s) of limitation.

Section 17.12 Taxes. City shall be solely responsible for any and all present or future taxes relating to the construction, ownership or leasing, operation or maintenance of the Facility, or any components or appurtenances thereof, or by reason of the sale and delivery of Renewable Energy to Westar, and all ad valorem taxes relating to the Facility.

Section 17.13 Waiver. Except as otherwise provided herein, the failure of either Party to enforce or insist upon compliance with or strict performance of any of the terms or conditions of this Agreement, or to take advantage of any of its rights thereunder, shall not constitute a waiver or relinquishment of any such terms, conditions, or rights, but the same shall be and remain at all times in full force and effect. No waiver by any Party hereto of any one or more defaults by the other Parties in the performance of any of the provisions of this Agreement shall be construed as a wavier of any other default or defaults whether of a like kind or different

nature. No failure or delay by any Party hereto in exercising any right, power, privilege, or remedy hereunder shall operate as a waiver thereof.

[remainder of this page intentionally left blank]

IN WITNESS WHEREOF, the Parties have caused this Renewable Energy Purchase Agreement to be executed by their duly authorized representatives as of the date first written above.

CITY OF EL DORADO:

By: 
Name: Herbert E. Llewellyn, Jr.
Title: City Manager

**KANSAS GAS AND ELECTRIC COMPANY
d/b/a WESTAR ENERGY, INC.:**

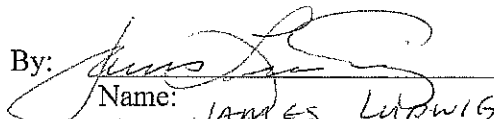
By: 
Name: JAMES LUDWIG
Title: EVP

EXHIBIT A

CONSTRUCTION MILESTONES

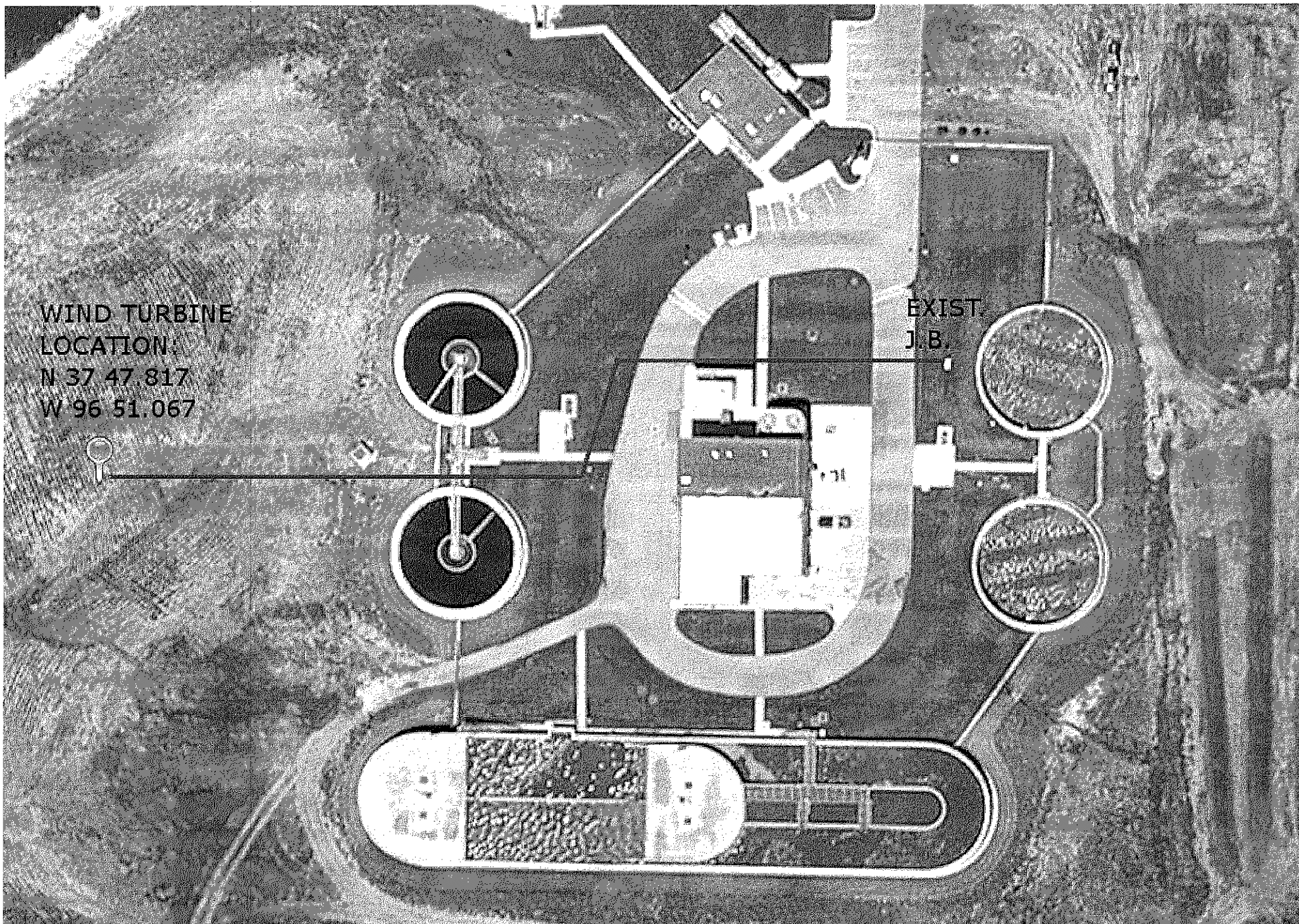
<u>Anticipated Date</u>	<u>Construction Milestone</u>
12/16/11	City shall provide Westar with copies of executed purchase orders/contracts for the delivery and installation of Facility turbine(s)/generator(s).
02/01/12	Commencement of construction.
04/15/12	Wind Turbine(s) shall have been installed at the Site.
04/16/12	Start-up testing of the Facility commences.
04/16/12	Electric power is first produced from the Facility.
04/23/12	Commercial Operation Date is Achieved (Commercial Operation Milestone)

EXHIBIT B

FACILITY DESCRIPTION AND SITE MAPS

WIND TURBINE
LOCATION:
N 37 47.817
W 96 51.067

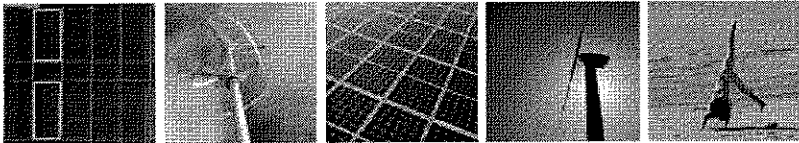
EXIST.
J.B.



Wind Turbine Generator – 60Hz Data Sheet

<u>Customer</u>	<u>Nordic Windpower</u>
PPI Engineering Contract No	8020
Frame Size	YFLS 450L - 4
Type	Induction Generator
International Standard	IEC60034
Ambient temperature range	-10degC to 48degC
Temperature Rise	Class 'B'
Insulation Specification	Class 'F'
Enclosure / Cooling	IP23 / IC01
Output kW	1000
Output KVA (Base)	1113
Voltage	690
Frequency Hz	60
No of Poles	4
Speed (rev/min)	1863
Full load current (amps)	931
Power factor 100% load (pf)	0.90
Power factor 75% load (pf)	0.86
Power factor 50% load (pf)	0.79
Efficiency 100% load (%)	93.5
Efficiency 75% load (%)	93.8
Efficiency 50% load (%)	93.5
No load current (amps)	289
Locked rotor current (amps)	6356
Locked rotor torque (%)	170
Pull out torque (%)	350
Stator line - line resistance @ 20degC (Ω)	0.0042
Direct Axis Transient Reactance X'd sat (pu)	0.13
Direct Axis Unsaturated Transient Reactance X'd unsat (pu)	0.15
Direct Axis SubTransient Reactance X''d (pu)	0.107
Negative Sequence Reactance X2 (pu)	0.10
Stator Phase Resistance @ 20degC R1 (Ω)	0.00624
Stator Reactance X1 (Ω)	0.0648
Rotor Resistance @ 20degC R2 (Ω)	0.0438
Magnetising Reactance Xm (Ω)	4.0721
Rotor Reactance @ running condition X2 (Ω)	0.123
Reactive Power @ No Load (kVAR)	345
Reactive Power @ Full Load (kVAR)	485
Terminations Connection / No ends out	Delta / 3
Stator winding temperature sensors	PT100 RTDs
DE Bearing Type / Code	Ball
NDE Bearing Type/ Code	Ball
Total Rotating Inertia H (pu to kVA base)	0.23

creating remarkable solutions for a higher quality of life



WIND TURBINE FEASIBILITY STUDY

EL DORADO WETLANDS AND WATER RECLAMATION FACILITY

Prepared For:
City of El Dorado
220 East First
El Dorado, KS 67043

April 13, 2010

GBA
architects
engineers

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Nordic N1000 Brochure and Data Sheet
 Nordic N1000 Indicative Proposal
 RETScreen Energy Model
 2009 annual Westar Energy statement

1. Overview

1.1 Introduction

The future of energy is uncertain. With volatile fuel and electrical costs, people are no longer taking for granted where their power comes from and how rising energy costs will impact their towns, schools, and businesses. In case study after case study, the average cost of power over the lifetime of a wind turbine is projected to be lower than traditional sources of power. In short, the energy you make is energy you don't have to pay for from other sources.

The following pages provide an overview of how the City of El Dorado can use the latest in wind energy technology to benefit from clean energy generation, lower their utility bill, secure a stable source of power and take advantage of all the attention a wind turbine can bring to a municipality.

1.2 Executive Summary

In pursuit of wind energy at the El Dorado Wetlands and Water Reclamation Facility, the City of El Dorado should plan to purchase a Nordic N1000 wind turbine; begin meeting with Westar Energy to establish net metering and interconnection agreements and commence the design phase of the wind turbine project.

The City shall also need to decide between the two sites at the WWTP property (see Section 5.1.1 Evaluated Scenarios). The west site is within the floodway and may incur additional permitting time and expense. The east site may not allow the footprint of the turbine foundation without disturbing the existing wetlands, given the setbacks required from the US 77 right-of-way.

2009 Cost of Energy	\$56.60 /MWh
2010 Cost of Energy	\$58.59 /MWh
Percent Increase	3.87%
2009 Energy Consumed	2,300 MWh
Wind Turbine Installed	Nordic N1000
Wind Turbine Capacity	1 MW
Estimated Turn-Key Cost	\$2,223,650
Annual Energy Production	2,430 MWh
Wind Energy consumed onsite	2,257 MWh
Wind Energy exported to Grid	174 MWh
Energy imported from Grid	43 MWh
Estimated Payback with Incentives	12.1 years

Figure 1.2: Recommendation Summary

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2. Wind and Energy Analysis

2.1 Project Site

The graphic below is an aerial photo showing the El Dorado Wetlands and Water Reclamation Facility property. The graphic is from Google Maps.

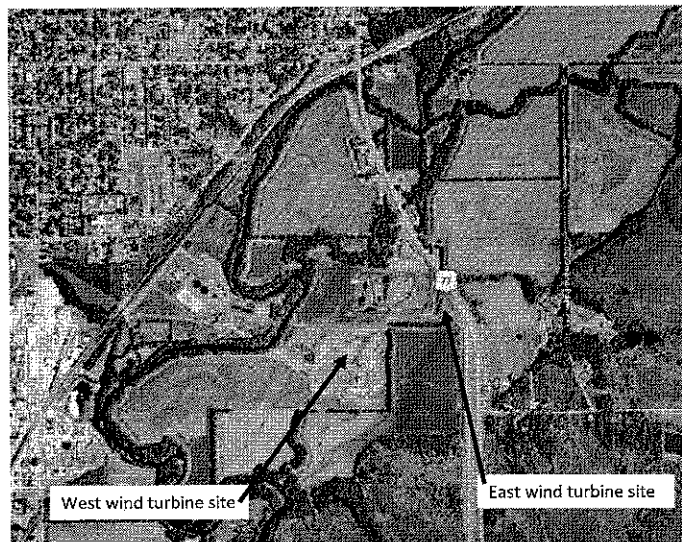


Figure 2.1a: Aerial Photo with East and West considered turbine locations

Two locations at the WWTP were analyzed in this report. The west location is just northwest of the existing wastewater treatment plant. The east location is abutting US77 at the entrance to the property. Three electric utility connection scenarios were analyzed in total for these two sites. The three scenarios are discussed in Section 5.1.1 Evaluated Scenarios.

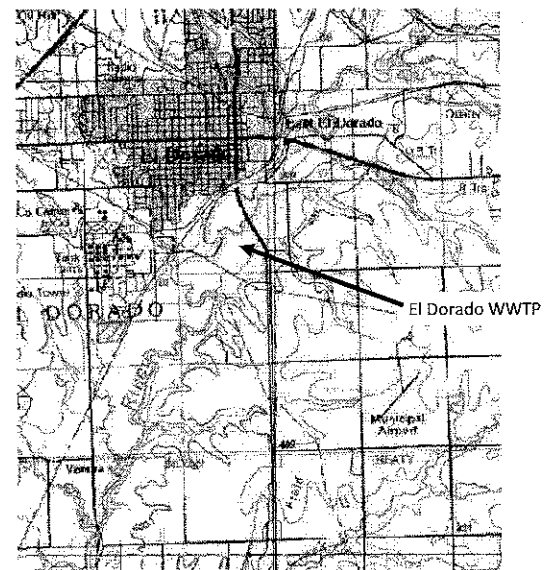


Figure 2.1b: USGS Topo Map

2.2 Data & Assumptions

2.2.1 Energy Consumption

Based on the 2009 annual Westar Energy statement, the energy use at the WWTP for 2009 was 2,300 MWh. The energy consumption averages 191.6MWh per month, ranging in 2009 from 157.5MWh in November to 230MWh in January. A comparison of the monthly energy consumption in 2009 to the mean wind speed can be found in Section 2.3.1 Wind Resources.

It is projected that the energy usage at the WWTP will increase each year as the population served by the plant is expected to increase each year.

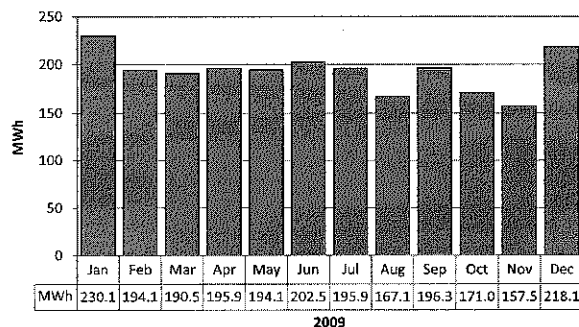


Figure 2.2.1: Monthly energy consumption (MWh) in 2009

2.2.2 Cost of Energy (COE)

The El Dorado Wetlands and Water Reclamation Facility paid an average of \$0.0566 per kWh in 2009. Of this average, \$0.0564 was for energy charges, fees and taxes that are based on power consumed each month and \$0.0002 was for fees and charges that are fixed each month.

Westar estimates the City of El Dorado will pay an average of \$.0588 per kWh in 2010. Of this average, \$0.0586 will be for energy charges, fees and taxes that are based on power consumed each month and \$0.0002 will be for fees and charges that are fixed each month.

2.2.3 COE Escalation Rate

The future costs of energy are uncertain; predictions on the rate of escalation vary greatly. The importance and the need for renewable energy technologies increase with the rise in energy costs. If carbon emission legislation is enacted, energy prices in regions heavily dependent on coal for electricity generation could see dramatic price increases.

Since 2006, retail electric energy costs in Kansas have increase at about 6% per year on average. Over the next 20 years, DOE-EIA predicts a nation-wide average annual increase of about 2.3% for industrial users, not considering the affect of possible carbon legislation.

The percentage increase in the City of El Dorado's utility bill from Westar Energy for 2010 is projected to be 3.87% higher than 2009.

2.3 Resource Assessment

2.3.1 Wind Resource

At the El Dorado Wetlands and Water Reclamation Facility, the expected long-term mean wind speed at 55m is 7.0 m/s, with a confidence range of 6.65 to 7.35 m/s. The expected mean wind power density is 286 W/m², and the best-fit Weibull k is 2.57.

Mean annual Wind Speed: 7 m/s (15.66 mph)

Power Density: 286 W/m²

Weibull A: 7.7 m/s (17.23 mph)

Weibull k: 2.57

50 Year Max Gust: 37.8 m/s (84.56 mph)

Uncertainty Estimate: +/- 0.35 m/s (0.78 mph)

Interannual Variation: 0.21

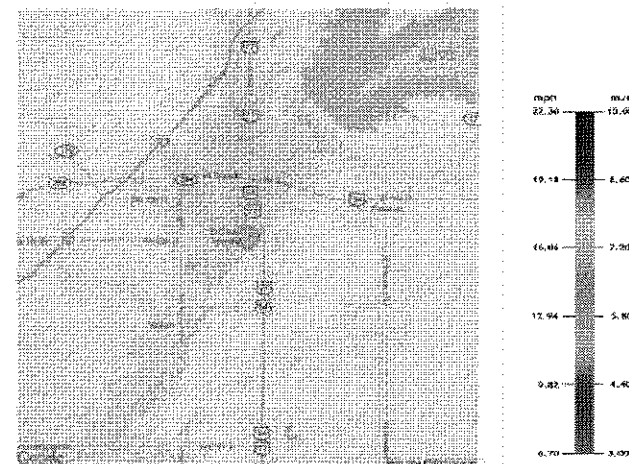


Figure 2.3.1a: Mean annual wind speed at 60m height

The wind resource estimates are based on AWS Truewind's proprietary atmospheric modeling systems, MesoMap and windTrends, available exclusively through windNavigator. The effective horizontal resolution of the wind resource data is 2.5 km. The power density is derived from the site speed frequency distribution and air density. The Weibull function is an analytical curve that describes the wind speed frequency distribution, or number of observations in specific wind speed ranges. Its two adjustable parameters allow a good fit to a wide range of actual

distributions. A is a scale parameter related to the mean wind speed while k is dependent on the width of the distribution. Values of k typically range from 1 to 3.5; the higher values indicate a narrower distribution. The interannual variation is the standard deviation of annual wind speed values from 1997 to the present.

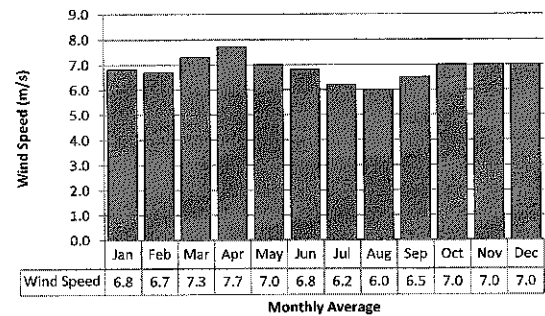


Figure 2.3.1b: Mean wind speed (m/s) by month at 55m height

A comparison of the monthly energy consumption in 2009 to the mean wind speed can be found in

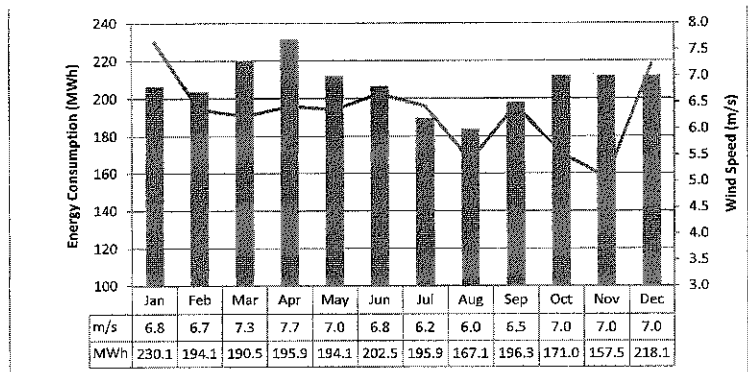


Figure 2.3.1c: Monthly energy consumption in 2009 compared to the mean wind speed at 55m height

A wind rose summarizes the typical distribution of wind speed and direction for a specific location. A wind rose shows the frequency of winds blowing from particular direction over a period of time that is typically 15-30+ years.

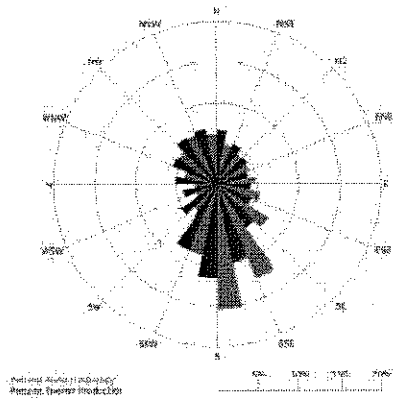


Figure 2.3.1c: Annual wind frequency and energy content (percent) by direction sector at 55m height.

2.4 Electric Utility Connection

2.4.1 Interconnection Requirements

The proposed wind turbine will be connected to supplement energy presently being purchased from Westar. The wind turbine would operate parallel to the utility source. The parallel connection is required for wind turbines to operate, and in fact they will not operate if there is no utility source available. Also, it is not recommended to operate in parallel with another generator (e.g. backup diesel generator). In the utility industry, operation of a customer's generator parallel to the 'grid' is called an "interconnection".

Keeping your system connected to the grid also allows you to continue to purchase power from the utility when your system generation does not meet your facility consumption needs. Special rules apply to interconnected customer generators. These rules are intended to protect the utility company's workers, ensure the reliable operation of their system and protect the customer's generator. Utilities require an Interconnection Agreement to be negotiated before you are able to connect to the grid.

There are a number of technical requirements for interconnection which are described in Westar's "Facility Interconnection Standard". The wind turbine will be required to comply with

these rules. Further, Westar has the right to charge the customer for modifications required to its system to accommodate the interconnection.

2.4.2 Disposition of Energy

The energy from an interconnected generator flows into the grid. Just as in the case of an oil or gas pipeline, it is not possible to say exactly what energy flows where. Energy from your generator may supply your plant or may supply your neighbor, or may supply another customer across the state. Electricity meters are installed to account for the flow of energy. There are several methods to meter customer-owned generators.

2.4.2.1 Separate Meter

The traditional approach is for the utility to provide a meter dedicated to the generator, which measures the energy produced and exported to the grid.

Since the federal Public Utility Regulatory Policies Act (or PURPA) was passed in 1978, most utilities have been required to purchase energy from anyone who can connect to the utility's system, at the utility's "avoided cost of energy." The avoided cost is defined by the Federal Energy Regulatory Commission (FERC). Avoided cost is normally much less than the retail rate utilities charge customers. The Kansas Corporation Commission now requires investor-owned utilities to pay 150% of the utility's avoided cost for customer-generated energy. Westar administers this under their Parallel Generation (PG) tariff rider. Westar's rate for April through June of 2010 will be \$0.0280 / kWh.

Many utilities, including Westar, now have regulatory requirements to produce a certain portion of their energy from renewable sources. This is called a renewable portfolio standard (RPS). Some utilities are now willing to pay more than avoided cost for renewable source energy. Westar indicated that they may be willing to negotiate a better rate for purchase of wind energy from this project.

Other options include selling the energy to the wholesale market or to remote users. Generally these options are not available for small generators such as this.

2.4.2.2 Behind the Meter

If the owner of the generator also is an energy consumer, it is usually advantageous to offset retail purchase of energy rather than sell the energy. This is usually accomplished by connecting the generator on the customer's side of the meter servicing the load.

Most utilities are willing to allow such an arrangement and will pay the customer for any excess generation at applicable purchase rates. The disadvantage of this arrangement is that if you have an unpredictable generation source, such as wind or solar, and output is not available when you need it to offset use, it must be sold to the utility at avoided cost rather than retail purchase rates.

Westar allows for behind-the-meter connection under their Parallel Generation tariff rider.

2.4.2.3 Net Metering

Recently many utilities, recognizing the value of renewable source energy, have taken the behind-the-meter concept one step further and agreed to offset excess generation against future retail purchases. This in effect allows the customer to use all of the renewable source generation to offset purchase at the retail rates.

Net metering allows a utility customer who produces more electricity than they consume to carry any net excess generation (NEG) forward at the full retail rate to periods where consumption exceeds generation. Any NEG remaining in the customer's account at the end of the accounting period (commonly calendar year) will be granted to the utility. In effect, the utility acts as a battery for the customer's excess generation. A net metered generator must be appropriately sized so as not to exceed expected consumption.

In May 2009 the Kansas legislature established a requirement for net metering for customers of investor-owned utilities in Kansas (HB 2369). A system capacity limit was set that allows residential systems up to 25 kW and non-residential systems up to 200 kW to offset onsite electricity consumption. HB 2369 gave the KCC one year to put rules for net metering into effect.

To date, Westar does not have a tariff for net metering. In discussions about this project, Westar has indicated a willingness to negotiate a net metering arrangement for the City of El Dorado for this project. This would probably be the most advantageous arrangement for the City.

2.5 Project Size Recommendation

The City has indicated a desire to produce enough energy on-site for operation of the WWTP. In 2009, the plant consumed approximately 2,300 MWh.

If an equitable long-term net metering arrangement can be negotiated with Westar, the wind turbine should be selected to offset expected energy use on an annual basis.

Without net metering, the economics of a wind turbine are uncertain. The next step would be to obtain daily and seasonal energy consumption profiles and perform a statistical estimate of likely energy bill reduction.

The City, desiring to be a "green" citizen, may elect to proceed with sizing to offset total annual energy use, even without net metering, but economic payback in that scenario is uncertain.

3. Site Evaluation

3.1 Permitting and Zoning requirements

3.1.1 Land Use regulations

For municipalities without a wind turbine ordinance, a special use permit is generally required for a wind turbine installation. Given that the project site is a municipal facility, it is assumed that local permits will be issued.

3.1.2 Federal Aviation Administration (FAA)

The Federal Aviation Administration (FAA) considers three impacts to airports and airspace: Imaginary Surface, Operational Impact, and Electromagnetic Interference. The FAA must be notified if a proposed structure's construction or alteration is

- taller than 200' above ground level
- within 20,000 feet of a public-use airport with at least one runway over 3,200' long and the structure exceeds a 100:1 surface from any point on the runway
- within 10,000 feet of a public-use airport with the longest runway less than 3,200' long and the structure exceeds a 50:1 surface from any point on the runway
- within 5,000 feet of heliport and the structure exceeds a 25:1 surface

The FAA must be notified through form 7460-1 (Notice of Proposed Construction or Alteration). After filing form 7460-1, it takes approximately 45 days for affected divisions to respond and the FAA to contact you. The FAA will at that point make a Determination of No Hazard to Air Navigation (DNH) or a Notice of Presumed Hazard (NPH). If the structure is issued a NPH, you will be issued a no effect height and an explanation of what you are affecting at the airport or in the airspace. Obstruction marking and or lighting may also be required.

The Captain Jack Thomas El Dorado Airport with two runways approximately 4,200' long each is located approximately 10,000' from the El Dorado Wetlands and Water Reclamation Facility property. The FAA will need to be notified of a wind turbine project at this site.

3.1.3 National Pollutant Discharge Elimination System (NPDES)

A National Pollutant Discharge Elimination System (NPDES) permit from the Kansas Department of Health and Environment (KDHE) will be required for the project work since disturbance will be greater than one acre. Because a permit is required, a Stormwater Pollution Prevention Plan will need to be prepared. The project will be required to utilize erosion and sediment control measures to minimize the impact on water quality to meet State and City requirements. The review period for the State on a NPDES permit is approximately 60 days.

3.1.4 Threatened and Endangered Species

The Endangered Species Act of 1973, et seq. (ESA, 16 UDC 35, Public Law 93-205) assigned the Department of Interior, U.S. Fish and Wildlife Service (USFWS) to establish a list of federally protected species. Projects which receive federal funding or federal approval, including permits,

must comply with ESA. The Kansas Department of Wildlife and Parks (KDWP) is responsible for the determination of state level status of species.

A list of federal and state listed species was reviewed for Butler County. Due to the current land use for the proposed turbine locations, maintained turf grass, it is unlikely threatened and endangered species or State species in need of conservation are present. However, prior to disturbance activities the USFWS and KDWP will be contacted to request records of threatened and endangered species in the project area.

3.1.5 Migratory Bird Act

Migratory birds are protected by the Department of Interior and USFWS according to the Migratory Bird Act. The Act states, "Unless permitted by regulations, the Act provides that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. Subject to limitations in the Act, the Secretary of the Interior (Secretary) may adopt regulations determining the extent to which, if at all, hunting, taking, capturing, killing, possessing, selling, purchasing, shipping, transporting or exporting of any migratory bird, part, nest or egg will be allowed, having regard for temperature zones, distribution, abundance, economic value, breeding habits and migratory flight patterns."

Coordination with USFWS should be conducted. The USFWS may require an avian assessment for the turbine project.

3.1.6 Bats

Coordination should be done with U.S. Fish and Wildlife Service regarding the need for any surveys including bat assessments. U.S. Fish and Wildlife will determine what surveys if any will be needed for the project.

3.1.7 Cultural Resources

As directed by Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended), the head of any Federal agency having jurisdiction or license control over a proposed undertaking shall take into account the effect of the undertaking on cultural resources included in or eligible for inclusion in the National Register of Historic Places (National Register).

In compliance with these regulations, consultation with the Kansas State Historic Office (SHPO) is required. The initial consultation shall be in the form of a letter sent to SHPO. They have 30 days to respond with clearance for the project or a request for a cultural resource survey.

According to the National Register several structures located within the City of El Dorado are on the list. SHPO may require the review of view shed impacts on the structures from the turbine.

3.1.8 Floodplain

Of the two proposed turbine locations, the east wind turbine site lies within Zone AE of the Special Flood Hazard Area Subject to the 1% Annual Chance Flood, more commonly known as the 100-yr floodplain, of the Walnut River. The other location lies within the Floodway boundaries of the river. The Floodway is described by FEMA as the area “where the water is likely to be deepest and fastest”. Any proposed fill or construction within the Floodway will require detailed engineering analyses to be performed and a No-Rise Certificate to be obtained. If a No-Rise Certificate cannot be obtained, notification to affected upstream property owners will be required. A floodplain development permit will be required for this project since it is in the floodplain or floodway.



Figure 3.1.8: Flood Insurance Rate Map (FIRM)

3.1.9 Wetlands and Other Waters of the United States

The U.S. Army Corps of Engineers (Corps) has been delegated authority to regulate waters of the U.S. (wetlands, streams, rivers, ponds, etc.) under the Clean Water Act. Section 404 of the Clean Water Act describes the dredge and fill responsibilities of the Corps.

According to the USGS Topographic map and an aerial photograph, a channel enters the northeastern section of the site at Highway 77 and flows southwest across the site to the Walnut River. The Walnut River is located to the west of the site. Created wetlands are located in the northern section. A USFWS National Wetlands Inventory was not available for review.

An onsite delineation of the site should be conducted prior to construction activities. If impacts greater than 1/10 of an acre to waters of the U.S. are proposed then contact with the Corps is required and a Section 404 permit obtained. If less than 1/10 acre of impacts is anticipated then a Nationwide Permit may be used. The review time for a Nationwide Permit is 45 days. Since the impacts for this project exceed 1/10 acre, then an Individual Permit will be required. The review time for an Individual Permit is 120+ days.

3.1.10 National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) (42 USC 4321-4347) requires that Federal agencies consider environmental consequences of major Federal actions and include these considerations in their decision making process. A NEPA document is to provide sufficient evidence and analysis to determine whether implementation of project work would result in significant effects on the environment. A NEPA document may be required for the project if federal funding is proposed.

3.2 Property Description

3.2.1 Project Property and Surrounding Area

The site is located at 37.79679 -96.85084, at an elevation of 387m (1269.8ft) above mean sea level. The surrounding area is cropland with occupied structures, including residences, within one mile of the property. All but the western border of Butler County is within the Flint Hills Ecoregion. The land east of US 77 is categorized as Heart of the Flint Hills area.

3.2.2 Wind Disturbance Area

A wind turbine is generally sited a distance away from obstacles to minimize the impact of turbulence on the turbine's performance. The rule of thumb is to place the turbine so that the lowest point of the rotor is 30' above any obstruction within 300'-500', depending in the prevailing wind direction. The setback in areas where topography includes steep hills and cliffs is greater due to additional turbulence.

3.3 Existing Infrastructure

3.3.1 Utility accessibility

The WWTP is served by Westar at 480 volts/3-phase from a pad-mounted transformer at the plant. The transformer is fed via underground primary cables from the overhead line along US77. Likely wind turbine options have 690 or 600 volt output and will require a dedicated transformer. The existing underground primary may be tapped or another connection made from the overhead line at US77 to serve the turbine.

3.3.2 Utility conflicts

As the property for the proposed wind turbines is an operating wastewater treatment plant, consideration needs to be given to the location of underground utilities when the site and size of the wind turbine foundation is determined. As-built utility plans will be required for this determination, as will a conversation with plant managers about areas for future expansion.

4. Technology Selection and Evaluation

4.1 Turbine Evaluation

Turbines considered for the El Dorado Wetlands and Water Reclamation Facility:

Manufacturer	Turbine	Size (kW)	Comment
Elecon	T600-48	600	Analyzed
Suzlon	S52-600	600	Analyzed
Aeronautica	Norwin 47-750	750	ARRA Section 1605 compliancy not available
Gamesa	G58-850	850	Analyzed
Vestas	V52-850	850	ARRA Section 1605 compliancy not available
Americas Wind Energy	AWE 54-900	900	Production not available
Mitsubishi	MWT-1000A	1,000	Analyzed
Nordic	N1000	1,000	Analyzed
Suzlon	S64-1.25	1,250	Analyzed
GE	GE 1.5	1,500	Meets ARRA Section 1605 compliancy, Determined to be oversized
Suzlon	S82-1.5	1,500	Determined to be oversized

Figure 4.1a: Wind turbines considered for analysis

The following annual energy productions were calculated for the analyzed turbines based on the assumptions stated below.

Assumptions-

- 7.0 m/s average wind at 55m above ground
- Wind shear exponent = 0.14
- Shape factor (Weibull k) = 2.57
- Average annual temp = 13C
- Average annual atm press = 97.6 kPa
- Average annual availability = 95%
- System losses = 0

Manufacturer	Turbine Model	Capacity (kW)	Hub Height (m)	Annual Energy Production (MWh)
Elecon	T600-48	600	50	1,660
Suzlon	S52-600	600	75	1,920
Gamesa	G58-850	850	55	2,160
Mitsubishi	MWT-1000A	1,000	55	2,560
Nordic	N1000	1,000	70	2,430
Suzlon	S64-1.25	1,250	65	3,430

Figure 4.1b: Annual Energy Production of selected Wind Turbines

Elecon returned GBA's first contact. The manufacturer's representative needed to determine if the turbine met ARRA Section 1605 compliancy and would send additional information on the

turbine. Elecon has not responded to the request for information prior to publication of this report. Due to the slow response time of communication, this turbine is not recommended.

Suzlon has not responded to the request for information prior to publication of this report. Due to the lack of responsiveness, unverified ARRA Section 1605 compliancy and lack of a monopole tower option on the S52-600 model, this turbine manufacturer is not recommended.

Gamesa has not responded to the request for information prior to publication of this report. Due to the lack of responsiveness and unverified ARRA Section 1605 compliancy, this turbine is not recommended. If a second choice of turbine or a smaller turbine model is needed, this manufacturer should continue to be pursued for additional information and verification of ARRA Section 1605 compliancy.

Mitsubishi responded immediately to GBA's requests for information and verification of ARRA Section 1605 compliancy. However Mitsubishi will not sell this model in quantities less than 60 units, so the MWT-1000A wind turbine was determined to not be an option.

Nordic responded immediately to GBA's requests for information and verification of ARRA Section 1605 compliancy. This is the recommended manufacturer and the Nordic N1000 turbine is discussed in greater detail below.

4.2 Turbine Recommendation

Based on the annual energy use of the facility, the annual energy production of analyzed turbines, the availability of wind turbine models and the responsiveness of the manufacturer, the Nordic Windpower N1000 wind turbine is recommend. The turbine data sheet can be found in the Appendix and the turbine is summarized below.

N1000 Technical Data	
Nominal Power	1000 kW
Certification	DNV Design to IEC Class IIIa
Rotor Diameter	59 m
Number of Blades	2
Hub Height	70 m
Diameter top/bottom	1.9/3.0m

Figure 4.2: Technical Data for Nordic N1000 Wind turbine

4.3 Turbine Sound Analysis

Noise produced by wind turbines has diminished greatly as technology has advanced to the point that the noise emitted by a wind turbine is often masked by the ambient noise of the wind itself. The energy in sound waves (and thus the sound intensity) will drop with the square of the distance to the sound source. In other words, if you move 200 m away from a wind turbine, the sound level will generally be one quarter of what it is 100 m away.

Technical Committee 88 (TC-88) of the International Electrotechnical Commission (IEC) developed the International standard for wind turbine acoustic noise measurement. IEC 61400-11 Noise Measurement was developed to provide a uniform methodology that will ensure consistency and accuracy in the measurement and analysis of acoustic emissions by Wind Turbine Generator Systems (WTGS). The Nordic N1000 is compliant with IEC 61400-11, with a noise level less than 104 dB(A) at 8 m/s at the hub.

The chart below illustrates comparative noise levels.

Noise	dB(A)
Quiet Room	45
Conversation	60
Vacuum Cleaner at 10'	70
Garbage Disposal	80
Hair Dryer	90
Garbage Truck	100
Leaf Blower	110
Clap of Thunder	120
Auto Racing	130
Trumpet, 5 inches away	150
12-gauge shotgun	165

Figure 4.3: Comparison Noise Levels dB(A)

Noise associated with the construction and turbine installation process may be significant. Any nearby residences, businesses and public facilities need to be taken into consideration during construction and installation scheduling to minimize the disturbance created by truck traffic, heavy equipment, blasting (if needed) and other activities

4.3 Additional Turbine Recommendations

Nordic Windpower recommends a 300 m /1000 ft setback from residences, hospitals, schools and parks. Deviations to 225m /750 ft will be considered with appropriate waivers, and adherence with noise, flicker concerns and local ordinances. Nordic Windpower also recommends a 110 m /360 ft setback from lightly used roads and property lines. Deviation may be considered based on local ordinances or an easement with adjacent property owner

5. Engineering and Economic Evaluation

5.1 Engineering Evaluation

5.1.1 Evaluated Scenarios

There were three scenarios considered. See Section 2.1 Project Site for location of east and west sites.

- Scenario 1: One Nordic wind turbine installed at the west site, on the customer side of the meter
- Scenario 2: One Nordic wind turbine installed at the east site, on the customer side of the meter
- Scenario 3: One Nordic wind turbine installed at the east site, all energy sold to Westar

All three scenarios will require very similar foundation, infrastructure improvements and permitting process, with the exceptions outlined below.

Scenario 1 will probably require relocation of the existing Westar revenue meter to upstream of the wind turbine and WWTP connection and transfer of the circuitry downstream of the new meter location from Westar to the City. The existing underground primary cables would be tapped with a new pad-mounted switchgear nearest the wind turbine location, and a new transformer dedicated to the wind turbine would be installed. Road modifications might be necessary for delivery of the tower sections based on turning radius on the approach leading to the (WWTP) facility. If after evaluation of the existing road it is determined that modifications are necessary a solution will be selected based on efficiency, economy, and impact of the surrounding area. A No-Rise Certificate will need to be obtained as this site is in the floodway.

Scenario 2 will probably require relocation of the existing Westar revenue meter to upstream of the wind turbine and WWTP connection and transfer of the circuitry downstream of the new meter location from Westar to the City. The existing underground primary cables would be tapped with a new pad-mounted switchgear nearest the wind turbine location, and a new transformer dedicated to the wind turbine would be installed. A floodplain development permit will need to be obtained as this site is in the floodplain. Wetland permitting may increase as there is little space between the US77 right-of-way and the existing wetland.

Scenario 3 will require probably require an electrical system similar to Scenario 2, except that a separate secondary meter will be installed instead of the primary meter and transfer of ownership of the circuitry should not be required. This will need to be confirmed with Westar. A floodplain development permit will need to be obtained as this site is in the floodplain. Wetland permitting may increase as there is little space between the US77 right-of-way and the existing wetland.

5.1.2 Utility Connection

Due to the turbine having outputs at 690 volts or 600 volts, it is recommended that a dedicated transformer be installed, connected at primary distribution voltage (12.47 kV) and with secondary voltage to match the turbine selected.

In order to accomplish net metering, it will be necessary to relocate the present Westar revenue meter from the WWTP location to a point upstream of the wind turbine and WWTP. The most likely location for the meter would be at Westar's dip pole near US77. As a primary meter, this will require transfer of all of the underground primary cables and transformer downstream of the meter from Westar to the City. Westar would expect to be compensated for this equipment. They have not been able to provide an estimate of cost for that. Based on cost of similar new facilities, we estimate the cost to be about \$71,000. The City would henceforth be responsible for maintenance of those facilities.

The connection method would be similar whether the turbine is located near the plant or near US77.

We have estimated the costs associated with this work, including the facilities to be transferred from Westar, and included it in the payback calculations.

5.1.3 Foundation Evaluation

A geotechnical investigation will be required before the foundation can be designed. At the present time, the quality of soils and depth to rock is not known. Since both proposed turbine locations are in the floodplain of the Walnut River, it is anticipated that the soils may not be very good and that some type of subgrade modifications may be needed if a spread footing type foundation is used.

The most common type of foundation is a spread footing type foundation. Another type of foundation is a deep foundation that could consist of piles driven into the ground or drilled shafts that are drilled into the ground and filled with reinforced concrete. After the geotechnical investigation is performed, the most economical foundation type will be determined.

5.1.4 Construction Assessment

Site disturbances should be limited to 3 acres with restoration to original condition following construction. This area will be used for lay down and staging of the turbine components as well as equipment and material staging. Additional space, which can be located in a secure area offsite, might be necessary for storage of crane and material transport trailers for the duration of the turbine erection.

The location selected for the turbine may require modifications or enhancements to existing roads or infrastructure. Road condition, gradient, and turning radius will be evaluated to

determine the modifications necessary to safely and efficiently deliver and erect the turbine and related components.

In addition, overhead power lines, power poles, property lines, and protected areas will be closely scrutinized to determine the most suitable route for transporting material and equipment to and from the site.

5.2 Economic Evaluation

5.2.1 Capital Costs for Major scenarios

The following are estimated prices only. Engineer's estimates and subcontractor bids when available were used.

Studies and Analysis	\$9,850
Engineering Design	\$110,000
Site Improvements	\$22,000
Construction	\$371,650 to \$483,300
Equipment and Installation	\$1,598,500
Commissioning and Training	\$0
Estimated Annual O&M Expense	\$17,500
Estimated Annual Utility Savings or Income	\$68,040 to \$132,260
Potential Kansas SEO Renewable Energy Incentives Grant	\$0 to \$250,000
Potential REC Income	\$0 to \$48,600

Figure 5.2.1: Summary Cost

The estimated prices in Figure 5.2.1a above include

- The Studies and Analysis cost is for the El Dorado Wind Turbine Feasibility Study
- The Engineering Design cost includes
 - geotechnical report and foundation design
 - electrical infrastructure design
 - NPDES Land Disturbance Permit with Stormwater Pollution Prevention Plan, Preliminary Agency Coordination for threatened and endangered species, Cultural Resources and Avian and Bat Assessment requirements, FEMA hydraulic analysis and permitting, Clean Water Act Section 404 Wetland identification and NEPA Questionnaire
- The Construction cost includes the excavation and construction of the foundation, the excavation and construction of the electrical infrastructure, staging of the wind turbine, and construction management during the construction phase

- The installation cost includes erection and installation of the pole, installation of the nacelle and blades and construction management during the installation phase
- The turbine estimated cost includes the turbine, commissioning, delivery and delivery insurance

The estimated prices in Figure 5.2.1a above do not include

- MET tower installations and results analysis
- FAA notice filings
- Federal, state, county and local permitting
- Acoustical studies
- Avian and Bat risk assessment and mitigation
- Cultural Resource Survey
- Threatened and Endangered species surveys and mitigation
- Section 404 Wetland delineation, permitting and mitigation
- Topographic Survey of the site
- Communication Design services
- View shed impact assessment
- Shadow Flicker analysis

5.2.2 Operating Costs

Nordic provides a full parts and labor equipment warranty for two years and options for up to five years. Service Care options are also available ranging from full O&M services to customer managed O&M. The table below summarizes the Service Care Options that Nordic offers. See the Nordic N1000 Indicative Proposal in the Appendix for more details on Nordic's Warranty and Service Care options.

Years 1 & 2	Years 3 to 5
Total Care Program	Basic Care Program
\$20,000/year	\$17,500/year

Figure 5.2.2: Nordic N1000 Operations and Maintenance package

5.2.3 Payback Analysis

An estimated payback period for the three scenarios outlined in Section 5.1.1 Evaluated Scenarios is shown below. The payback without incentives, payback with the Kansas State Energy Office Renewable Energy Incentives Grant and Renewable Energy Credit (REC) income, and payback with incentives and an increasing cost of energy is shown. See Section 5.2.6 Renewable Energy Credit (REC) for more information on RECs.

Scenario 1: One Nordic wind turbine installed at the west site, on customer side of the meter

	Simple Payback	Simple Payback with Incentives	Payback with Incentives and increasing COE
Studies and Analysis	\$9,850	\$9,850	\$9,850
Engineering Design	\$110,000	\$110,000	\$110,000
Site Improvements	\$22,000	\$22,000	\$22,000
Construction	\$483,300	\$483,300	\$483,300
Equipment and Installation	\$1,598,500	\$1,598,500	\$1,598,500
Commissioning and Training	\$0	\$0	\$0
TOTAL	\$2,223,650	\$2,223,650	\$2,223,650
Renewable Energy Incentives Grant	\$0	\$250,000	\$250,000
NET TOTAL	\$2,223,650	\$1,973,650	\$1,973,650
Estimated Average Annual O&M Expense	\$17,500	\$17,500	\$17,500
Estimated Average Annual Utility Savings*	\$132,260	\$132,260	\$201,002
REC Income (\$.02/kWh)	\$0	\$48,600	\$48,600
AVERAGE NET ANNUAL SAVINGS	\$114,760	\$163,360	\$232,102
Payback	19.4 years	12.1 years	8.5 years

*Average calculated over 20 years assuming a 4% annual cost of energy (COE) increase

Figure 5.2.3a: Scenario 1 Cost and Payback

Scenario 2: One Nordic wind turbine installed at the east site, on customer side of the meter

	Simple Payback	Simple Payback with Incentives	Payback with Incentives and increasing COE
Studies and Analysis	\$9,850	\$9,850	\$9,850
Engineering Design	\$110,000	\$110,000	\$110,000
Site Improvements	\$22,000	\$22,000	\$22,000
Construction	\$470,800	\$470,800	\$470,800
Equipment and Installation	\$1,598,500	\$1,598,500	\$1,598,500
Commissioning and Training	\$0	\$0	\$0
TOTAL	\$2,211,150	\$2,211,150	\$2,211,150
Renewable Energy Incentives Grant	\$0	\$250,000	\$250,000
NET TOTAL	\$2,211,150	\$1,961,150	\$1,961,150
Estimated Average Annual O&M Expense	\$17,500	\$17,500	\$17,500
Estimated Average Annual Utility Savings*	\$132,260	\$132,260	\$201,002
REC Income (\$.02/kWh)	\$0	\$48,600	\$48,600
AVERAGE NET ANNUAL SAVINGS	\$114,760	\$163,360	\$232,102
Payback	19.3 years	12.0 years	8.4 years

*Average calculated over 20 years assuming a 4% annual cost of energy (COE) increase
Figure 5.2.3b: Scenario 2 Cost and Payback

Scenario 3: One Nordic wind turbine installed at the east site, all energy sold to Westar

	Simple Payback	Simple Payback with Incentives	Payback with Incentives and increasing COE
Studies and Analysis	\$9,850	\$9,850	\$9,850
Engineering Design	\$110,000	\$110,000	\$110,000
Site Improvements	\$22,000	\$22,000	\$22,000
Construction	\$371,650	\$371,650	\$371,650
Equipment and Installation	\$1,598,500	\$1,598,500	\$1,598,500
Commissioning and Training	\$0	\$0	\$0
TOTAL	\$2,112,000	\$2,112,000	\$2,112,000
Estimated Annual O&M Expense	\$17,500	\$17,500	\$17,500
Estimated Annual Utility Income	\$68,040	\$68,040	\$101,305
AVERAGE NET ANNUAL INCOME	\$50,540	\$50,540	\$83,805
Simple Payback	41.8 years	41.8 years	25.2 years

Note: Scenario 3 is not eligible for the Renewable Energy Incentive Grant or RECs.

*Average calculated over 20 years assuming a 4% annual cost of energy (COE) increase
Figure 5.2.3c: Scenario 3 Cost and Payback

With net metering, a simple payback of 8.4 to 19.4 years can be expected depending on incentives received. This assumes zero inflation and makes an estimate on the expected increase in the cost of energy beyond the 2010 rates.

5.2.4 Cost for no action

El Dorado's electric bill is expected to be 3.87% higher in 2010 compared to 2009 due to new rates. Assuming an annual electric utility expense of \$135,000, the table below shows the accrued expense of continuing to purchase 100% of the consumed energy. Accrued expenses with an annual increase in the rates are also shown.

	Possible Rate Increases			
Length of Time	0.0%	2.5%	5.0%	7.5%
5yrs	\$675,000	\$709,604	\$745,960	\$784,133
10yrs	\$1,350,000	\$1,512,457	\$1,698,015	\$1,909,857
15yrs	\$2,025,000	\$2,420,810	\$2,913,106	\$3,525,979
20yrs	\$2,700,000	\$3,448,529	\$4,463,904	\$5,846,132

Figure 5.2.4: Projects Cumulative Westar Energy Bills

5.2.5 Renewable Energy Credit (REC)

Renewable Energy Credits (RECs) or Green Tags: While still an emerging market and not available in all states or counties, RECs are a tradable commodity representing units of energy generated from renewable sources. The REC purchaser receives only a certificate as the

renewable energy is placed on the grid where it is generated; the funds generated subsidize the cost of renewable energy generation. A potential \$0.01 to \$0.04 per kWh in RECs is available in areas with a Renewable Portfolio Standard (RPS) or where voluntary buyers can be found.

For comparative purposes, we included an option receiving \$0.02 per kWh for REC's in Section 5.2.3 Payback Analysis.

5.3 Financial Incentives

5.3.1 Grants

Kansas Renewable Energy Incentives Grant: The Kansas State Energy Office created the Renewable Energy Incentives Grant to distribute funding received from the U.S. Department of Energy (DOE), under the Energy Efficiency and Conservation Block Grant (EECBG) program. The purpose of the Renewable Energy Incentives Grant is to provide funding through a competitive grant process to assist the public sector in developing, implementing and installing a renewable energy source.

Four rounds of grant applications with funding totaling \$3.8 million have already begun. The deadline for Round 1 has passed. The deadline for Round 2 is April 15, Round 3 is June 15 and Round 4 is July 23. Eligible projects include solar and wind installations with a nameplate capacity of at least 25kW.

5.3.2 Tax incentives

Modified Accelerated Cost-Recovery System + Bonus Depreciation (MACRS + Bonus): A number of renewable energy technologies are classified as five-year property in MACRS, including most types of solar, wind turbines 100kW or less, and geothermal. Additionally, a 50% bonus depreciation provision in year one for eligible renewable energy systems is available.

Since this project is over 100kW, MACRS does not apply.

Sales Tax and Property Tax Exemption: Many states have statutes exempting the value added to a property by the addition of a renewable energy system from property taxes. Other state statutes exempt the total cost of the renewable energy system from the state sales tax.

Since this is a public project, we have not included sales tax in the cost estimates.

5.3.3 Alternative / Third-party ownership

Power Purchase Agreement (PPA): This is an agreement that a user enters into with a private entity which is responsible for owning and maintaining a wind turbine at the facility, while selling the power it generates to the facility at favorable rates. These agreements are long-term and allow for a predictable cost of electricity over the life of the wind turbine. In addition, it has the advantage of eliminating the need for a large up front capital expenditure and removes the responsibility for annual maintenance. Many such PPA investors exist, and are particularly interested in working with state, county and local governments as well as

educational institutions, for the obvious reason that budgets are generally stable and continued use of the facilities into the future is certain.

The City has indicated they are not interested in this option.

5.4 Additional Benefits

5.4.1 Energy Independence

Diversifying one's energy portfolio reduces the dependence on imported fossil fuels and the associated volatile prices. Generating your energy locally helps keep the economic benefits in the community. The decentralized energy generation also helps to reduce the burden on the national grid, improving its reliability.

5.4.2 Educational and Marketing Opportunities

While it is easy to understand how lower, predictable utility bills benefit one's bottom line, many additional benefits that cannot be summarized in economic terms come with wind energy. Most consumers prefer sustainable business practices, and a wind turbine is a very conspicuous statement of commitment to sustainability. And while wind turbines have been generating electricity in the United States for over 120 years, El Dorado, Kansas has yet to see a community scale wind turbine installed. The publicity generated for the City of El Dorado for taking this step towards independent and clean energy generation will spread throughout the community and across the state.

5.4.3 Clean Electricity

Wind is a renewable, pollution free source of electricity. Wind Energy does not generate air or water emissions. It does not release greenhouse gasses such as carbon dioxide. Wind energy does not deplete a natural resource. It is estimated that by installing 1,000 kW of wind energy the City of El Dorado will prevent 1,745 metric tons of carbon dioxide from being released into the atmosphere every year. This is equivalent to the emissions from 334 passenger vehicles.

6. Project Phases and the Next Steps

The typical steps in a Renewable Energy Project are

1. Prefeasibility Discussion
2. Feasibility Study and Discussion
3. Engineering Design
4. Construction
5. Installation and Commissioning
6. Operations and Maintenance
7. Decommissioning

City of El Dorado is in the second phase of a Renewable Energy Project by completing this Wind Turbine Feasibility Study.

6.1 Engineering Design

The engineering design phase includes

- Commissioning and review of geotechnical study
- Foundation design
- Electric infrastructure design
- Environmental studies for required permitting
- Site improvement design
- Utility coordination

The permitting and financing paperwork also begins in this phase.

6.2 Construction

A typical construction schedule would include

- Ordering turbine and electrical components
- Filing and/or collecting required permits
- Preparation of the site, including any required construction access improvements and erosion control measures
- Excavation and installation of the foundation
- Excavation and installation of the electrical infrastructure
- Staging of the wind turbine, including blades, nacelle and pole

6.3 Installation and Commissioning

Following the construction of the needed infrastructure, the wind turbine can be assembled and erected. Once the turbine is erected, a commissioning agent will commission the systems. Weather can play a large factor in the cost and time schedule of the installation and commissioning phase. While strong winds are beneficial for generating energy, winds have to be calm for the installation process. Additionally, portions of the commissioning process require strong enough winds to turn the rotor.

6.4 Operations and Maintenance

Annual maintenance is important to protect the investment that is a wind turbine. Operation and maintenance packages, as well as extended warranties, can be purchased from the manufacture or a third party provider.

Additional insurance coverage is often needed for the wind turbine.

6.5 Decommissioning

Turbines have a typical design life of 20-30 years, depending on the level and quality of maintenance. Regardless, a turbine owner should plan for the expense of decommissioning at the end of the useful life of the system. Current options include dismantling the turbine, deconstructing the electrical service and removing the top portion of the foundation; or replacing the turbine and electrical and structural components as needed, with a newer, more efficient turbine. It is not feasible to project a course of action or associated cost for decommissioning.

7. GBA Background

GBA is a full-service professional design firm providing a wide range of sustainable engineering, architectural and planning design solutions to clients in the public and private sectors. These clients include cities, counties, state and federal agencies, school districts, commercial and residential developers, major corporations, hospitals, educational institutions, utility companies, professional service firms, and contractors.

Since GBA's establishment in 1969, the firm has grown dramatically in both size and capability. Some of this growth can be attributed to the expanded use of services by many of GBA's earliest clients. GBA's growth is also the result of the firm's ability to attract a highly qualified staff of professionals representing a broad spectrum of design and planning disciplines. This enables GBA to organize "in-house" project teams with the specialized experience uniquely suited for each project.

With an experienced multi-disciplined staff, GBA provides clients with a wide range of project types and design capabilities including

- | | |
|---------------------------------------|------------------------------------|
| ➤ Sustainable design | ➤ Residential development |
| ➤ Architecture and programming | ➤ Park and recreation facilities |
| ➤ Planning and urban design | ➤ HVAC systems |
| ➤ Civil/Site development | ➤ Energy studies |
| ➤ Surveying | ➤ Utility studies and systems |
| ➤ Structural engineering | ➤ Fire protection and life safety |
| ➤ Fleet maintenance facilities | ➤ Hazardous waste management |
| ➤ Industrial development | ➤ Water treatment and distribution |
| ➤ Roadways and bridges | ➤ Sewage collection and treatment |
| ➤ Traffic analysis and engineering | ➤ Environmental studies |
| ➤ Stormwater management | ➤ Construction Management |
| ➤ Lake and dam design and restoration | ➤ Commissioning |

GBA has worked hard to establish and maintain a reputation for uncompromising quality, on-time project completion, and fair and reasonable fees.

Each project is considered in its entirety, within the boundaries specified by the client and with the comprehensive experience and expertise of the GBA staff. The result is an innovative, functional, and cost-effective design.

8. Disclaimer

The information in this study is presented in response to the agreement between George Butler Associates, Inc. (GBA) and the City of El Dorado Kansas dated March 29, 2010. The information presented herein is based on wind development best practices, commercially available information and virtual wind data provided by AWS Truewind, LLC. GBA makes no guarantees, expressed or implied, as to the actual outcome of the processes described in this report.

9. Appendix



► **N1000 1-MW TURBINES**

Light & Flexible Design

Greater Reliability

& Lower Cost

Gearbox and Drive train

- A key component of turbine reliability is gearbox survivability. N1000 gearboxes show exceptional low wear, even after many years of operation. Many design features reduce gearbox loading.
- The reduced hub weight reduces load on the drive train.
 - The telescopic drive shafts are harmlessly before they reach the gearbox.
 - The main drive-shaft bearings are integrated into the planetary gearbox design for greater strength.
 - An integrated cylindrical machinery housing locks the gearbox, drive shaft and generator into one lightweight, robust load-carrying unit.

Yaw System

The N1000 probably stands as the world's most reliable yaw system. By using the whole swept area to determine wind direction, the N1000 achieves true instantaneous orientation. The hydraulic yaw motors provide damping for smooth operation and for reducing tower loads and oscillations. The system reads no expensive yaw brakes.

Tower

Because of the flexible, lightweight turbine design, the tower is lighter than those needed for heavier turbines. Overall, the N1000—including tower, nacelle and blades—is up to 40% lighter than other turbines with the same output.

Low capital cost

Easy, inexpensive maintenance

Inexpensive installation

Exceptionally high reliability

Ready & investor acceptance

Blades

A two-blade system minimizes loads and costs. Two blades allow the use of a common drive-race, virtually eliminating torque ripples and providing significantly longer service life and trouble-free operation.

Because of reduced fatigue loading, the design can focus on extreme conditions. Shaft control for limiting power in high wind reduces drive train loads and lowers system cost. For shutdown, unique slip brakes pivot the tip of the blade. And as an added safety feature, the hydraulic system achieves passivity.

Easy to Install & Service

The nacelle design greatly simplifies construction. Unlike three-blade turbines, the two blades are attached before lifting the nacelle. In addition, the nacelle can be lifted at higher wind speeds, reducing weather delays.

The universal yaw motor and a simple nacelle move 12-metric tons around the machinery with safety and intelligence under real

Principle Ideas of Design

The N1000 TAW turbine implements a lighter, simpler design than traditional wind turbines, providing a lower overall cost of energy and greater reliability. In traditional turbine design, the amount of cast-iron in the nacelle is proportional to the amount of cast-iron in the tower. The N1000 nacelle is a "load-carrying" unit, while the tower is a "load-carrying" unit. The design approach is based on precise calculations of the engineering capabilities of the entire system and configures the turbine so that high component loads never occur.

The result is a turbine that is both lighter and more reliable. In fact, N1000 turbines have performed at 98% reliability with no major component failures for up to ten years. They have produced more than 100,000 hours of reliable operation in coastal and extreme wind conditions.



N1000 Technical Data

GENERAL

Nominal power	1,000 kW
Rated wind speed	16 m/s
Operational range	4-25 m/s, 4-22 m/s
Extreme wind speed	56 m/s (standard)
Control principle	Stall

WIND TURBINE

Turbine diameter	54 m, 59 m
Orientation	Upwind
Rotational speed	25 rpm, 15 rpm
Blade tip speed	71 m/s, 66 m/s
Blade material	GRP / Carbon
Type of hub	Teeter
Teeter bearing	Elastomeric
Maximum teeter	±2°

GENERATOR - 600V & NEMA 3 are options

Type of generator	4-pole induction
Rating	1,000 kW
Voltage	600 V / 690 V
Protection	NEMA3 / IP54
Cooling	Liquid (glycol-water)
Power factor	0.98 at 100% power

BRAKING SYSTEM

Air brake	Turnable blade tips
Activation/deactivation	Centrifugal force/hydraulics
Mechanical brake	Disc brake with two calipers
Activation/deactivation	Spring/hydraulic pressure

GEARBOX

Type	2 planetary & 1 stage helical, integrated turbine bearings
Gear ratio	1:87
Cooling	Heat exchanger

YAW SYSTEM

Type of bearing	Rolling bearing
Drive	Hydraulic motors with planetary gearboxes

TOWER

Type	Welded steel tube, painted
Hub height	70 m standard
Diameter top/bottom	1.9/3.0 m

CONTROL SYSTEM

Distributed control system
IEC 61131-3 compliant turbine controller
SCADA system



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US assembly plant:

Building 36, 669 W. Quinn Road, Pocatello, ID 83201

UK technology office:

2430 The Quadrant, Aztec West, Almondsbury,
Bristol, BS32 4AQ, United Kingdom

Registered office:

100 New Bridge Street,
London EC4V 6JA, United Kingdom

email: info@nordicwindpower.com

www.nordicwindpower.com

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Nordic N1000 (60Hz)- Data Sheet	
N1000 Technical Data	
GENERAL	
Nominal power	1000 kW
Rated wind speed	16 m/s
Operational range	4-22 m/s
Certification	DNV Design to IEC Class IIIB
Extreme wind speed	52.5 m/s
Operational Temperature Range	-10° - +40° Celsius
Survival Temperature Range	-20° - +50° Celsius
Control principle	Stall
WIND TURBINE	
Rotor diameter	59 m
Number of blades	2
Rotor orientation	Upwind
Rotational speed	23 rpm
Blade tip speed	72 m/s
Blade material	GRP/Carbon
Type of hub	Teeter
Teeter bearing	Elastomeric
BRAKING SYSTEMS	
Aerodynamic blade tip brakes	
Hydraulic disc brake on rotor shaft	
GEARBOX	
Type	2 planetary & 1 stage helical, integrated turbine bearings
Gear ratio	1:81
Cooling	heat exchanger
GENERATOR	
Rating	1,000 kW
Type of generator	4-pole induction
Voltage	690 V
Environmental Protection	NEMA3/IP34
Cooling	Air
Power factor	0.98 at 100% power
YAW SYSTEM	
Hydraulic drive motors	
TOWER	
Hub height	70 m
Diameter top/bottom	1.9/3.2 m
Type	Welded steel tube, painted
Number of tower sections	2
Tower weight	60 tonnes
CONTROL SYSTEM	
Distributed control system	
IEC 61131-3 compliant turbine controller	
SCADA system	
WEIGHTS	
Nacelle, with hub	44 tonnes
Blades (each)	4.2 tonnes
NOISE LEVEL	
Less than 104 dB(A) at 8 m/sec	
IEC 61400-11 compliant	

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www.nordicwindpower.com



INDICATIVE PROPOSAL
FOR
SUPPLY OF WIND TURBINES
TO

George Butler Associates, Inc

PROJECT:
El Dorado KS WWTP

Nordic Windpower USA Inc (hereinafter called "Nordic") is pleased to submit an indicative proposal to you (hereinafter called "Customer") to supply *Nordic N1000* wind turbines, including nacelles, blades, and towers, for projects under development by Customer (hereinafter called the "Projects"). Other equipment, field assembly, and other site related services may be offered separately.

This proposal is provided to you on a confidential basis, and you agree to hold it in confidence along with all trade secrets and proprietary information to which you may have become privy to as a result of this proposal or any relationship with Nordic in response to this proposal. We thank you for your trust in Nordic and if you have any questions or comments, please contact me. We look forward to working with you to complete a successful project.

1. **Scope of Delivery**

- N1000 Class IIIB 1000 kW Wind Turbines nacelle
- 59 meter rotor blade diameter.
- 70 meter hub height tower.
- Supervision for installation and commissioning, training for erection and operation.
- The Equipment includes lightning protection, DNV certification, and CE certification of the electrical equipment.
- Two year parts and labor warranty subject to entering into a two year maintenance and service program.

Items not included in the Scope of Supply by Nordic:

- Power grid and communications connections.
- Generator pad-mount transformer package.
- Civil site work including but not limited to modifications of/ or to roads, bridges, driveways, parking lots, pads, footings and foundations.
- Tower foundation and anchoring system including bolts.
- Installation & Erection. Nordic to provide consultation and instruction.
- Cranes, common assembly tools and site preparation equipment.
- Erection personnel.
- Soils survey, federal, state and local permits and approvals.
- Uninterruptible power supplier for turbine controller for extended grid outages.
- Recommended spare parts inventory.
- Cold Weather Package is not included.

2. Terms of delivery

EXW US factories for Nacelle and Tower. FOB USA port of entry for blades. Estimated delivery costs to site are \$65,000 to \$75,000.

3. Price*

Model:	N1000-59
Tower:	70m
1-9 units:	\$1,330,000 each

***Conditions**

Prices are valid for orders placed by June 31, 2010. Lead time is expected to be 6-9 Months from Order Reservation Payment receipt.

4. Payment

The following are our proposed payment terms for this project:

- 10% upon Order reservation. Execution of Turbine Supply Agreement within 45 days.
- 15% of total is to be paid to Nordic, and combined with the above Order Reservation payment, and becomes a non-refundable Down Payment upon

execution of the Turbine Supply Agreement. Buyer and Nordic to mutually agreed on the form of payment security from the Buyer for the balance of the contract value, and performance security from Nordic at the time the Down Payment is made.

- 25% progress payment 6 months before scheduled delivery.
- 25% progress payment 3 months before scheduled delivery.
- 15% upon delivery EXW Pocatello ID for nacelles and FOB USA port towers, and India port for rotor blades ("delivery points").
- 10% of total to be paid, upon Commissioning on a per WTG basis, but in no event later than 60 days after the wind turbine equipment has arrived at the project site, but no more than 90 days from the delivery points.

5. Schedule

Delivery will vary depending upon project specifics. Currently, Nordic expects a 6 - 11 month lead time.

6. Warranty and Service Care Options

Nordic provides a full parts and labor equipment warranty for two (2) years from acceptance and options for up to five (5) years. Service Care options are also available ranging from full O&M services to customer managed O&M. Nordic proposes the following Service Care Options below. See your account manager for other Service Care Program offerings.

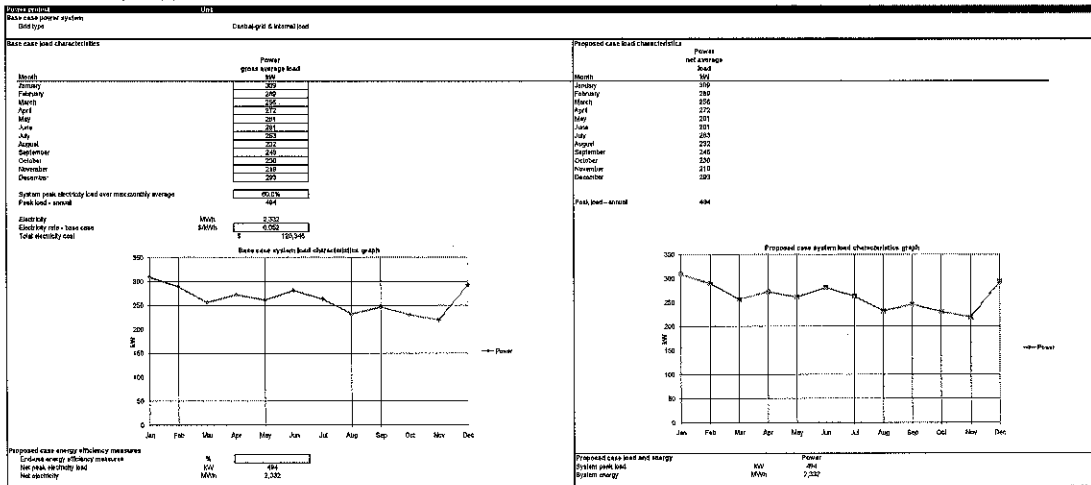
WTG Units per Project Site	Years 1 & 2 Total Care Program¹ With Warranty	Years 3 to 5 Basic Care Program² w/o Warranty
1- 5 units:	\$20,000 per WTG/Year	\$17,500 per WTG/Year
6 -9 units:	\$17,500 per WTG/Yea	\$15,000 per WTG/Yea

¹Total Care Program by Nordic provides a repaired or new replacement component parts, transport to deliver part to site, and labor to remove and install as a result of an unplanned failure, including crane expense if/as needed – and the services provided in the Basic Care Program below.

²Basic Care Program includes all scheduled inspections, adjustments, lube & filter changes, consumable part replacements. Customer pays for unplanned part replacements and repairs resulting from failures.

The warranty and service period shall and will commence at the date of commissioning of the wind turbine, but in no event at any date later than 60 days after

The service terms must be agreed upon and entered into at the time of executing the Turbine Sales Agreement. The cost of the service package may be adjusted based on the estimated production at the site, the turbulence in the wind resource, the size of the wind farm and other site specific issues. Pricing assumes a Nordic standard Warranty and Service Agreement. All Service and Maintenance prices are indexed to the consumer price index and do not include sales taxes.



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RETScreen-1



SOUTH

Company Name: City of El Dorado
Account Number: 2526967502

105 W Wetlands Dr

Generation Substitution Service

Bill Date	KWH
January	230,100
February	194,100
March	190,500
April	195,900
May	194,100
June	202,500
July	195,900
August	187,100
September	183,300
October	171,000
November	157,500
December	218,100
Monthly Average	191,875
Total	2,300,100

Demand	Power Factor	PF	Load Demand	Energy Charge	Fuel Charge
445	90.00%	445	86.50%	\$9,224.20	\$3,581.14
435	90.00%	435	54.48%	\$7,123.59	\$2,852.14
418	90.00%	418	63.65%	\$6,573.02	\$2,789.25
431	90.00%	431	63.13%	\$7,073.21	\$2,678.58
395	90.00%	395	66.05%	\$6,353.62	\$2,652.14
401	90.00%	401	70.14%	\$7,235.68	\$2,975.58
377	90.00%	377	69.84%	\$6,881.47	\$2,878.59
381	90.00%	381	58.95%	\$6,058.16	\$2,455.40
398	90.00%	398	65.95%	\$6,589.57	\$2,663.45
390	90.00%	390	63.84%	\$6,149.67	\$2,512.71
371	90.00%	371	58.96%	\$5,728.45	\$2,314.54
425	90.00%	425	71.27%	\$7,781.80	\$3,204.61
407	90.00%	407	84.64%	\$8,805.80	\$3,816.51
Total				\$82,747.25	\$33,788.13

Property	Transmission	EPA	Customer Change	Total
445.62	\$1,183.28	\$184.51	\$40.00	\$12,942.90
442.70	\$998.64	\$155.47	\$40.00	\$11,127.45
441.91	\$980.12	\$162.59	\$40.00	\$10,803.07
442.10	\$1,007.61	\$168.92	\$40.00	\$11,113.52
442.70	\$998.64	\$155.47	\$40.00	\$10,957.38
444.55	\$1,041.89	\$162.20	\$40.00	\$11,410.98
442.10	\$1,007.61	\$156.62	\$40.00	\$11,021.79
436.76	\$859.73	\$133.65	\$40.00	\$9,508.97
440.33	\$943.06	\$146.82	\$40.00	\$10,372.00
437.62	\$879.80	\$136.67	\$40.00	\$9,678.52
434.65	\$810.34	\$126.16	\$40.00	\$8,964.63
447.96	\$1,122.12	\$174.70	\$40.00	\$12,275.25
442.17	\$998.17	\$153.53	\$40.00	\$10,949.55
4508.02	\$11,834.01	\$1,942.38	\$460.00	\$130,195.78
Avg. kWh				0.0566

Generation Substitution Service - 2

Bill Date	KWH
January	230,100
February	194,100
March	190,500
April	195,900
May	194,100
June	202,500
July	195,900
August	187,100
September	183,300
October	171,000
November	157,500
December	218,100
Monthly Average	191,875
Total	2,300,100

Demand	Power Factor	PF	Load Demand	Energy Charge	Fuel Charge
445	90.00%	445	86.50%	\$7,612.58	\$4,220.57
435	90.00%	435	54.48%	\$6,038.56	\$3,560.58
418	90.00%	418	63.65%	\$6,388.80	\$3,484.54
431	90.00%	431	63.13%	\$6,575.23	\$3,583.65
395	90.00%	395	66.05%	\$6,457.06	\$3,580.58
401	90.00%	401	70.14%	\$6,719.34	\$3,714.67
377	90.00%	377	69.84%	\$6,477.56	\$3,583.60
381	90.00%	381	58.95%	\$6,033.30	\$3,065.29
398	90.00%	398	65.95%	\$6,121.38	\$3,562.47
390	90.00%	390	63.84%	\$5,710.44	\$3,136.53
371	90.00%	371	58.96%	\$5,351.28	\$2,898.19
425	90.00%	425	71.27%	\$7,221.21	\$4,000.54
407	90.00%	407	84.64%	\$8,402.00	\$3,816.10
Total				\$76,884.35	\$42,193.17

Property	Transmission	EPA	Customer Change	Total
446.75	\$1,255.43	\$399.81	\$40.00	\$13,441.94
473.18	\$1,069.01	\$337.35	\$40.00	\$11,692.63
471.82	\$1,039.37	\$331.09	\$40.00	\$11,221.96
472.65	\$1,069.83	\$340.47	\$40.00	\$11,544.78
473.18	\$1,069.01	\$337.35	\$40.00	\$11,380.83
476.34	\$1,104.84	\$351.65	\$40.00	\$11,851.45
473.65	\$1,069.89	\$340.47	\$40.00	\$11,449.51
468.00	\$911.70	\$290.42	\$40.00	\$9,877.72
498.10	\$1,000.09	\$318.58	\$40.00	\$10,779.40
464.47	\$932.86	\$297.20	\$40.00	\$10,052.98
456.38	\$859.32	\$273.74	\$40.00	\$9,334.15
452.22	\$1,139.85	\$378.06	\$40.00	\$12,749.94
472.28	\$1,045.78	\$333.13	\$40.00	\$11,289.73
4897.14	\$12,548.26	\$3,897.57	\$460.00	\$135,237.30
Avg. kWh				0.0566

Spreadsheet uses an average fuel charge.

Percentage Increase: 3.97%



P.O. Box 758500
Topeka, KS 66675-8500
1-800-826-0026

Service Address
105 W WETLANDS DR
EL DORADO, KS 67042

Web ID 345522377

Statement Date 02/01/2010
Account Number 2526367502
Invoice Number 78342 / 10

Rate Schedule GSS - S

Contract Capacity 100

CITY OF EL DORADO
PO BOX 792
EL DORADO, KS 67042-0792

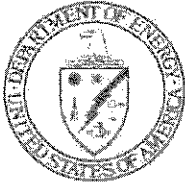
Deposit None

Meter Information							
Meter Number	Service Period		Days	Meter Reading		UOM	Units Used
	From	To		Previous	Present	Multiplier	
06675789	12-13-2009	01-15-2010	33	20638	21555	KWH	245,100
K9675789	12-13-2009	01-15-2010	33	8701	9006	KVARH	91,500

Billing Determinants			
Billing Determinant	UOM	Billing Determinant Value	Date & Time
Actual On-Peak Demand	KW	427	01/08/2010 04:45 PM
Actual Off-Peak Demand	KW	428	01/12/2010 08:00 AM
Billing Capacity	KW	427	
Power Factor	PF	0.937	
Energy	KWH	245,100	

Billing Charges					
Product Item Name	Quantity	UOM	Unit Price	Proration Factor	Extended Price
Customer Charge					\$40.00
First 70 KWh per KW	29,890 KWH	at	\$0.043703 x	=	\$1,306.28
Next 180 KWh per KW	68,320 KWH	at	\$0.038034 x	=	\$2,598.48
Additional KWh	146,890 KWH	at	\$0.032385 x	=	\$4,754.09
Fuel Charge	245,100 KWH	at	\$0.010089 x	=	\$2,472.81
Property Tax Surcharge	245,100 KWH	at	\$0.000122 x	=	\$29.90
Transmission Delivery Charge	245,100 KWH	at	\$0.005145 x	=	\$1,261.04
Environmental Charge	245,100 KWH	at	\$0.000801 x	=	\$196.33

Franchise Fee	Exempt	00.0%	\$632.85
State Sales Tax	Exempt	100.0%	\$0.00
County Sales Tax	Exempt	100.0%	\$0.00
City Sales Tax	Exempt	100.0%	\$0.00
Total Current Charges			\$13,291.68
Amount Due By February 17, 2010			\$13,291.68



Department of Energy

Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3305

DOE/EA-1833

FINDING OF NO SIGNIFICANT IMPACT AND FLOODPLAIN STATEMENT OF FINDINGS CITY OF EL DORADO WIND ENERGY PROJECT EL DORADO, BUTLER COUNTY, KANSAS

AGENCY: U.S. Department of Energy, Golden Field Office

ACTION: Finding of No Significant Impact (FONSI)

SUMMARY: The U.S. Department of Energy's (DOE's) Proposed Action is to authorize the expenditure of federal funding appropriated under the *American Recovery and Reinvestment Act* (Recovery Act) to design, permit, and construct the El Dorado Wind Energy Project (Wind Energy Project), a 1.0-megawatt wind turbine to be located immediately west of the El Dorado Wetlands and Water Reclamation Facility in El Dorado, Butler County, Kansas.

DOE has made these funds available to the Kansas Corporation Commission (KCC) through the Energy Efficiency and Conservation Block Grant (EECBG) Program¹; however, DOE must complete review of the Wind Energy Project under the National Environmental Policy Act (NEPA) before KCC may issue a subgrant to provide EECBG funding for the construction of the Wind Energy Project.

Based on the information and analyses in the final Environmental Assessment (EA), DOE has determined that its Proposed Action does not constitute a major federal action that would significantly affect the quality of the human environment within the meaning of the National Environmental Policy Act (NEPA). Therefore, an environmental impact statement (EIS) is not required, and DOE is issuing this FONSI.

All discussion, analysis, and findings related to the potential impacts of construction, operation and eventual decommissioning of the Wind Energy Project, including the applicant-committed measures, are contained in the final EA. The final EA is hereby incorporated by reference.

This FONSI was prepared in accordance with the *National Environmental Policy Act of 1969* (NEPA), the Council on Environmental Quality regulations for implementing NEPA, as amended, 40 CFR 1500 to 1508, and DOE NEPA regulations 10 CFR 1021.

ENVIRONMENTAL IMPACTS: The final EA examined the potential environmental impacts of the Proposed Action and of a No-Action Alternative. Under the No-Action Alternative, DOE would not authorize the use of EECBG funds for the Wind Energy Project, which DOE assumes for purposes of the final EA would not be constructed or operated.

The proposed City of El Dorado Wind Energy Project would be constructed and operated on property owned by the City and located immediately west of the El Dorado Wetlands and Water Reclamation

¹ Prior to the issuance of this FONSI, DOE authorized the Kansas Corporation Commission (KCC) to use a percentage of their federal funding for preliminary activities, which include preparation of the El Dorado Wind Energy Project EA. These activities are associated with the Proposed Project and do not significantly impact the environment nor represent an irreversible or irretrievable commitment by the Department of Energy in advance of the conclusion of the EA for the Proposed Project.



Facility. The proposed project site is zoned for light industrial use. The proposed wind turbine is anticipated to offset approximately 6,175 kilowatts of electrical load on a daily basis and fulfill approximately 98 percent of the Facility's annual electricity demand. This would enable the City to reduce electrical demands from the existing electrical provider and lower its carbon footprint. The proposed project would employ approximately eight people during construction.

Based on the information presented within the final EA, DOE concludes that the design, permitting, construction, and operation of the El Dorado Wind Energy Project would not have measurable impacts to the following resources: historic and cultural resources, geology and soils, visual resources, biological resources including threatened and endangered species, human health and safety, transportation, social and economic conditions including minority or low-income populations, air quality and climate change, utilities and energy, water resources, and impacts related to intentional destructive acts.

Implementation of the proposed project would permanently commit less than one acre of previously disturbed, agricultural land and temporarily disturb less than one acre of previously disturbed agricultural cropland owned by the City of El Dorado. The area immediately surrounding the proposed turbine location would remain agricultural cropland. The proposed project would result in minimal direct or indirect impacts and a negligible irretrievable commitment of land (See Section 3.2.2.1 of the EA).

Noise would be generated by construction equipment during the project's short-term construction phase. However, the construction noise would not be expected to significantly increase ambient noise levels. During operations, estimated turbine noise levels at the nearest residence would be less than 37 A-weighted decibels (dBA), which is lower than the Butler County noise statute levels and U.S. Environmental Protection Agency noise level guidelines of 55 to 65 dBA for the Day Night Average Sound Level. Therefore, no significant impacts are expected (See Section 3.2.2.3 of the EA).

Implementation of the proposed project would introduce a new and dominant vertical feature into the existing viewshed. The visual impact of the wind turbine is reduced because of other already existing vertical elements in the area such as electrical transmission towers and various oil refinery production towers. The results of the shadow flicker study commissioned by the City for this project indicates shadow flicker would have the potential to affect up to five receptors, all single-family residences, with the greatest impacts to one receptor for a maximum of 1.42 hours per year. Approximately 3,000 feet of US-77 would experience shadow flicker effects. The majority of the impacted roadway would experience less than 2 hours of shadow flicker per year. Therefore, significant adverse visual impacts that would affect nearby residences or users of the project area and surrounding areas are not anticipated as a result of the El Dorado wind project (See Section 3.2.2.2 of the EA).

There are no historic properties within the project site. The nearest historic property is located approximately 1.25 miles north of the project location. No archeological resources appear to be located within the construction footprint, and the nearest archaeological site is located over 1,350 feet from the project location. DOE does not anticipate encountering cultural resources during construction or ground disturbance. In accordance with Section 106 of the National Historic Preservation Act (NHPA), DOE determined that the proposed project would have no adverse impacts on the subject property or other historic properties or cultural resources. The Kansas Historical Society also concluded that no historic properties would be affected by the proposed project. In response to tribal consultation requests, responses were received from the Kickapoo Tribe of Indians in Kansas, the Osage Nation of Oklahoma, the Prairie Band Potawatomi Nation, and the Iowa Tribe of Kansas and Nebraska. All four tribes expressed no objections to the proposed project (See Section 3.2.2.4 and Attachment C-7 in Appendix C of the EA).

A primary area of environmental concern for the operation of wind turbines is the potential to injure or kill birds and bats. Analysis in the final EA indicates that the proposed project is not likely to adversely affect bat species and would have no adverse effects on federally listed species. Recommendations as

described in the United States Fish and Wildlife Service (USFWS) *Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines* (2003) were included in the siting, design and installation plans for the El Dorado Wind Energy Project. In addition, El Dorado has incorporated and will implement several of the best management practices (BMPs) from the USFWS Wind Turbine Guidelines Advisory Committee's Site Development and Construction BMPs. Based on the analysis in the final EA, DOE determined that impacts to biological resources were not significant (See Section 3.2.2.6 of the EA).

According to an FAA letter dated September 28, 2010, the initial aeronautical study performed for the proposed project indicated the project would be a presumed hazard to air navigation. The FAA indicated that a favorable determination could be made if the structure height was reduced to 306 feet (93 meters) above ground level or if the FAA performed additional studies for the original height (330 feet/101 meters). The City of El Dorado requested that the FAA perform the additional study of the original tower height. The FAA performed the requested study and issued a "Determination of No Hazard to Air Navigation" letter to the City of El Dorado. The Determination was subject to review if an interested party filed a petition. No petitions were received by the FAA and the determination became final on January 10, 2011 (See Section 3.2.2.7.5 of the EA).

FLOODPLAIN STATEMENT OF FINDINGS: The El Dorado Wetlands and Water Reclamation Facility is located in the 100-year floodplain, and the regulatory floodway, of the Walnut River, as shown in Appendix A – Figure 13 of the final EA; therefore, DOE conducted a floodplain assessment pursuant to Executive Order 11988, Floodplain Management, and DOE implementing regulations at 10 CFR Part 1022, "Compliance with Floodplain and Wetland Environmental Review Requirements" (see Attachment D-7, Appendix D of the EA). Section 2.3.3 of the EA, as well as the floodplain assessment, describes the project alternatives considered by the City of El Dorado. The proposed project area is currently leased for crop production. Implementation of the proposed project would temporarily impact the floodplain/floodway during excavation and trenching activities associated with the construction of the wind turbine foundation/tower and/or the installation of underground electrical connections to the Wetlands and Water Reclamation Facility. After completion of these activities, the affected floodplain areas would be graded, seeded, and restored to their previous condition. The proposed project will require a No-Rise certification be obtained from the Assistant City Engineer to ensure that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base (100-year) flood event. Discussions with the City's Assistant Engineer during the development of the final EA indicated that based on the information available for the proposed project, no adverse effects regarding floodplain issues or the issuance of a No-Rise Certification are anticipated. Therefore, DOE expects no long-term adverse direct or indirect impacts to the beneficial values of the 100-year floodplain and regulatory floodway of the Walnut River (See section 3.2.2.12.2 of the EA).

PUBLIC PARTICIPATION IN THE EA PROCESS: In accordance with applicable regulations and policies, DOE sent a scoping notice on September 13, 2010, to federal, state, and local agencies; tribal governments; elected officials; businesses; organizations and special interest groups; providing 15 days to submit comments regarding the EA's scope. DOE published the Notice of Scoping online at the DOE Golden Field Office Public Reading Room and City of El Dorado website. The recommended avenues of inquiry within the letters were addressed within the final EA. In response to the scoping notices, a total of two comments were received; one from the Federal Aviation Administration (FAA) and one from the U.S. Environmental Protection Agency (EPA). These documents are included in Attachment D-1 in Appendix D of the EA.

In addition, DOE initiated consultation with the U.S. Fish and Wildlife Service (USFWS), the Kansas State Historical Society (KSHS), the Kaw Nation, the Kickapoo Tribe of Indians in Kansas, the Osage Nation of Oklahoma, the Prairie Band of Potawatomi Nation, the Sac and Fox Tribe of Missouri in Kansas and Nebraska, the Iowa Tribe of Kansas and Nebraska, and the Wichita and Affiliated Tribes. Appendix C of the final EA contains copies of consultation letters and responses, as well as other agency communications initiated as part of the final EA.

DOE published the draft EA online at the Golden Field Office Public Reading Room and the DOE NEPA Website for a 15-day review period which ended December 31, 2010². Postcards announcing the Notice of Availability (NOA) were mailed to stakeholders (Attachment D-1 in Appendix D of the EA) and the NOA was published online on the DOE NEPA Website. The NOA was also published in the Wichita Eagle newspaper on December 14, 2010, and the El Dorado Times newspaper on December 15, 2010. DOE received four comments during the comment period from the USFWS, the Kansas Department of Agriculture (two comments) and the Kansas Water Office. The comments and responses to comments were incorporated into the final EA and are located in Appendix E of the EA.

DETERMINATION: Based on the information presented in the final EA (DOE/EA 1833), DOE determined that the Proposed Action would not constitute a major federal action significantly affecting the quality of the human environment within the context of NEPA. Therefore, the preparation of an EIS is not required and DOE is issuing this FONSI.

The applicant has committed to obtain and comply with federal, state and local permits and applicable regulations required for construction, operation and eventual decommissioning of the Wind Energy Project. Necessary permits and applicant committed measures can be found in Sections 2.4 and 2.5 of the EA and shall be incorporated and enforceable through DOE's financial assistance agreements.

The final EA is available at: <http://www.ece.energy.gov/golden/ReadingRoom.aspx> and the DOE NEPA website at <http://nepa.energy.gov>.


For questions about this FONSI, contact:

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For further information about the DOE NEPA process, contact:

Office of NEPA Policy and Compliance
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585
202-685-4600 or 1-800-472-2756

Issued in Golden, CO, this 11th day of February, 2011.


Carol Battershell
Manager, DOE Golden Field Office

² The comment period was extended for one additional day as the EA was not officially posted on line until December 16, 2010.

20-year term, 2.43% interest rate

5.00%

100%

\$1,967,650

1 MW

Annual Energy Escalation Rate

Project Financing

Million Financed (assumes \$250,000 Grant)

On-Site Wind Energy Generation

Facility: El Dorado Wetland & Water Reclamation Facility

AEC: 2,313,100 kWh

Turbine: N1000 Nordic Windpower (1,000 kW)

AEP: 2,484,136 kWh

Hub Height: 70m

Wind Speed 7.24 m/s

Year	Estimated Energy Generated & Consumed kWh/yr	Estimated Energy Generated & Sold kWh/yr	Estimated Energy rate \$/kWh	PPA rate \$/kWh	Estimated Savings \$	Service & Maintenance Payment \$	0% Forgiveness				40% Forgiveness			
							Loan Payment \$	Total Payment \$	Net Savings \$	Cumulative Net Savings \$	Loan Payment \$	Total Payment \$	Net Savings \$	Cumulative Net Savings \$
1	2,278,923	205,213	\$0.0700	\$0.0290	\$165,476	\$20,000	\$133,677	\$153,677	\$11,799	\$11,799	\$80,200	\$100,200	\$65,276	\$65,276
2	2,278,923	205,213	\$0.0735	\$0.0290	\$173,452	\$20,000	\$133,677	\$153,677	\$19,775	\$31,574	\$80,200	\$100,200	\$73,252	\$138,528
3	2,278,923	205,213	\$0.0772	\$0.0290	\$181,827	\$35,000	\$133,677	\$168,677	\$13,150	\$44,724	\$80,200	\$115,200	\$66,627	\$205,155
4	2,278,923	205,213	\$0.0810	\$0.0290	\$190,621	\$35,875	\$133,677	\$169,552	\$21,069	\$65,793	\$80,200	\$116,075	\$74,546	\$279,701
5	2,278,923	205,213	\$0.0851	\$0.0290	\$199,854	\$36,772	\$133,677	\$170,449	\$29,405	\$95,198	\$80,200	\$116,972	\$82,882	\$362,583
6	2,278,923	205,213	\$0.0893	\$0.0290	\$209,549	\$37,691	\$133,677	\$171,368	\$38,181	\$133,380	\$80,200	\$117,891	\$91,658	\$454,242
7	2,278,923	205,213	\$0.0938	\$0.0290	\$219,729	\$38,633	\$133,677	\$172,310	\$47,419	\$180,798	\$80,200	\$118,833	\$100,896	\$555,137
8	2,278,923	205,213	\$0.0985	\$0.0290	\$230,418	\$39,599	\$133,677	\$173,276	\$57,142	\$237,940	\$80,200	\$119,799	\$110,619	\$665,756
9	2,278,923	205,213	\$0.1034	\$0.0290	\$241,642	\$40,589	\$133,677	\$174,266	\$67,375	\$305,316	\$80,200	\$120,789	\$120,852	\$786,609
10	2,278,923	205,213	\$0.1086	\$0.0290	\$253,426	\$41,604	\$133,677	\$175,281	\$78,145	\$383,461	\$80,200	\$121,804	\$131,622	\$918,231
11	2,278,923	205,213	\$0.1140	\$0.0290	\$265,800	\$42,644	\$133,677	\$176,321	\$89,479	\$472,940	\$80,200	\$122,844	\$142,956	\$1,061,187
12	2,278,923	205,213	\$0.1197	\$0.0290	\$278,792	\$43,710	\$133,677	\$177,387	\$101,405	\$574,345	\$80,200	\$123,910	\$154,882	\$1,216,069
13	2,278,923	205,213	\$0.1257	\$0.0290	\$292,434	\$44,803	\$133,677	\$178,480	\$113,954	\$688,300	\$80,200	\$125,003	\$167,431	\$1,383,501
14	2,278,923	205,213	\$0.1320	\$0.0290	\$306,759	\$45,923	\$133,677	\$179,600	\$127,159	\$815,458	\$80,200	\$126,123	\$180,636	\$1,564,136
15	2,278,923	205,213	\$0.1386	\$0.0290	\$321,799	\$47,071	\$133,677	\$180,748	\$141,051	\$956,509	\$80,200	\$127,271	\$194,528	\$1,758,664
16	2,278,923	205,213	\$0.1455	\$0.0290	\$337,591	\$48,248	\$133,677	\$181,925	\$155,666	\$1,112,176	\$80,200	\$128,448	\$209,143	\$1,967,808
17	2,278,923	205,213	\$0.1528	\$0.0290	\$354,173	\$49,454	\$133,677	\$183,131	\$171,042	\$1,283,218	\$80,200	\$129,654	\$224,519	\$2,192,327
18	2,278,923	205,213	\$0.1604	\$0.0290	\$371,585	\$50,690	\$133,677	\$184,367	\$187,217	\$1,470,435	\$80,200	\$130,890	\$240,694	\$2,433,021
19	2,278,923	205,213	\$0.1685	\$0.0290	\$389,866	\$51,958	\$133,677	\$185,635	\$204,231	\$1,674,666	\$80,200	\$132,158	\$257,708	\$2,690,729
20	2,278,923	205,213	\$0.1769	\$0.0290	\$409,062	\$53,257	\$133,677	\$186,934	\$222,128	\$1,896,795	\$80,200	\$133,457	\$275,605	\$2,966,335